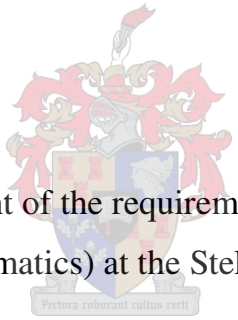
Intra-organisational information and knowledge sharing: exploring persistent barriers

Hilda Kruger



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Date: March 2010

Declaration

By submitting this thesis electronically, I declare that the entirety of the work contained therein is my own, original work, that I am the owner of the copyright thereof (unless to the extent explicitly otherwise stated) and that I have not previously in its entirety or in part submitted it for obtaining any qualification.

Date: 31 October 2009

To Botha Kruger

You are my super star

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Abstract

When studying information and knowledge management case studies, it becomes evident that barriers to information and knowledge sharing persist, even in organisations that are lauded for their IKM initiatives. This study set out to probe why this is the case. To this end the study explored persistent barriers to information and knowledge sharing through an investigation of a Most Admired Knowledge Enterprise (MAKE) award winning organisation. It was predicted that the persistent barriers would correspond to the characteristics of organisations as complex social systems. Results indicated that the persistent barriers identified in the MAKE award winning organisation mirror the characteristics of complex social systems.

The findings suggest one possible explanation for the persistence of barriers to information and knowledge sharing, namely that these barriers are rooted in the nature of organisations as complex systems. Viewing poor information and knowledge flows through a complex social systems lens draws attention to the 'wicked' nature of the issue, i.e. the reality that persistent barriers form interacting meshes that can at best be mitigated but not eliminated. Also, viewing persistent barriers as inherent in organisations suggest alternative ways of attending to these barriers.

Opsomming

‘n Oorsig van inligting- en kennisbestuur (IKB) gevallestudies wys duidelik dat hindernisse tot inligting- en kennisdeling gedurig volhou, selfs in organisasies met hoogs aangeskrewe IKB inisiatiewe. Die oogmerk van hierdie studie was om vas te stel waarom dit so is. Die studie het daarom hardnekkig volhoudende hindernisse tot inligting- en kennisdeling binne ‘n erkende *Most Admired Knowledge Enterprise* (MAKE) organisasie ondersoek. Dit is voorspel dat die volhoudende hindernisse sou ooreenstem met eienskappe van organisasies as komplekse sosiale stelsels. Die bevindinge het gewys dat volhoudende hindernisse wat binne die erkende MAKE organisasie identifiseer is, wel die eienskappe van komplekse sosiale stelsels weerspieël.

Die bevindinge wys op een moontlike verklaring vir die hardnekkig volhoudende bestaan van hindernisse tot inligting- en kennisdeling, naamlik dat hierdie hindernisse spruit uit die aard van organisasies as komplekse stelsels. Deur na suboptimale inligting- en kennisvloei deur die lens van ‘n komplekse sosiale stelsel te kyk, word die ‘wicked’ aard van die probleem uitgewys, dit wil sê ‘n realiteit waar volhoudende hindernisse interaktiewe strikke vorm wat bloot aangespreek, maar nie elimineer kan word nie. Alternatiewe maniere word voorgestel hoe sulke hindernisse aangepak kan word.

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Chapter 1
Introduction

"*Indeed, most people are unaware of some basic facts about novel and complex problems*." (Conklin, 2006:4)

1.1 Introduction

There is broad agreement in management literature that organisational information and knowledge creation, sharing, and leveraging is a prerequisite for organisational effectiveness, efficiency, and competitiveness in the knowledge economy (e.g. Davenport & Prusak, 1998:13; Nonaka & Takeuchi, 1995:6, Kolekofski & Heminger, 2003:521, Van de Ven, 2004:125). This could explain why - considering the nominees of the annual Most Admired Knowledge Enterprise [MAKE] award - the who's who of organisations are touting their commitment to information and knowledge management (IKM).

Fontaine and Lesser (2002:1) note that, while organisations reap important benefits from their investment in IKM - they more often than not face significant challenges in their efforts. They conclude that a failure to address these challenges "*can hinder the effectiveness of a knowledge management effort, costing organisations time, money, resources and - perhaps, most importantly - their ability to affect meaningful business results.*"

A number of authors suggest that fluent information and knowledge flows within organisations are the exception rather than the rule, and that fluent information and knowledge flows at the organisational level therefore require systematic, formal interventions, i.e. IKM interventions. Husted and Michailova (2002:61), for example, assert that in many cases organisations and their employees "*are inherently hostile to knowledge sharing.*" Scholl et al. (2004:26) identify barriers to knowledge sharing as "*the most pressing and challenging practical problem for the understanding and*

advancement of knowledge management." Szulanski (2003:25), in his seminal book on barriers to knowledge transfer, warn that "*numerous complications*" mean that knowledge transfer rarely proceeds without difficulties, while Riege's 2005 study identifies three-dozen barriers that may impede information and knowledge sharing within organisations. Many IKM case studies lend credence to Murphy's Law, which states that if anything can go wrong, it will go wrong!

An informal 2006 poll conducted by the author amongst information and knowledge managers in a range of South African organisations brought to light that none of the managers polled perceived his or her organisation to be entirely 'barrier-free'. This left the author with the following question: why do barriers to information and knowledge sharing persist, even in organisations that have sophisticated, formal IKM programmes in place? It is this question that led to the present study. This study will build on the work done by the authors mentioned earlier by exploring *persistent* barriers to information and knowledge sharing, and venturing an explanation regarding *why* certain barriers persist. The study ventures that the explanation can be laid at the door of organisations as inherently complex entities. John Gall (in Ackoff and Rovin, 2003:1) alludes to the issue when he says:

"Large systems usually operate in failure mode. The system tends to oppose its own proper function."

1.2 Thesis statement

Certain barriers to intra-organisational information and knowledge sharing persist because they are rooted in the nature of organisations, i.e. they stem from the characteristics of organisations as complex social systems.

1.3 Problem statement

The problem statement diverges into two interrelated themes:
(1) What barriers to intra-organisation information and knowledge sharing persist?
(2) Do these barriers correspond to the characteristics of complex social systems?

1.4 Research question/s

The broad question is whether persistent intra-organisational barriers to information and knowledge sharing correspond to the characteristics of complex systems. Specific questions - based on Cilliers' (1998:2-5) characterisation of complex systems - may be formulated as follows:

- Does the reality that an organisation consists of a large number of elements impede information and knowledge sharing within the organisation?
- Does the reality that the large number of elements within the organisation interact dynamically impede information and knowledge sharing within the organisation?
- Does the reality that the dynamic interaction between the elements is rich impede information and knowledge sharing within the organisation?
- Does the reality that the interactions among elements are non-linear impede information and knowledge sharing within the organisation?
- Does the reality that the interactions usually have a fairly short range impede information and knowledge sharing within the organisation?
- Does the reality that there are positive and/or negative feedback loops in the interactions impede information and knowledge sharing within the organisation?
- Does the reality that organisations are open systems impede information and knowledge sharing within the organisation?
- Does the reality that organisations operate under conditions far from equilibrium impede information and knowledge sharing within the organisation?
- Does the reality that organisations have a history impede information and knowledge sharing within the organisation?
- Does the reality that each element in the system is ignorant of the behaviour of the system as a whole impede information and knowledge sharing within the organisation?

1.5 Research objectives

"Chaos and complexity are metaphors that posit new connections, draw our attention to new phenomena, and help us see what we could not see before." (Hayles in Tsoukas, 2005:232)

The research objective of this study is to explore persistent barriers to intra-organisational information and knowledge sharing through a complex systems lens. More specifically, the question of whether these barriers stem from the characteristics of organisations as complex systems will be looked at. Focusing on the characteristics of organisations as complex systems allows us to put forward one explanation for the persistence of barriers to information and knowledge sharing, even in so-called 'Most Admired Knowledge Enterprises'. The study posits that the barriers that persist because they are innate to organisations as complex social systems are of a special class - they are 'wicked'.

Mason and Mitroff (in McLucas, 2003:105) describe 'wicked problems' as follows:

"Wicked problems are not necessarily wicked in the perverse sense of being evil. Rather, they are wicked like the head of a hydra. They are an ensnarled web of tentacles. The more you attempt to tame them, the more complicated they become."

If we find that persistent barriers amount to 'wicked' problems, it will make sense why practitioners who continue to apply the tools, methods and thinking suited to 'tame' or 'technical' problems have limited success in mitigating them. In the case of certain persistent barriers, practitioners may even have to entertain the notion that they are "*beyond our capacity, and we simply cannot do anything about it, hard as we might try.*" (Heifetz, 2009:22)

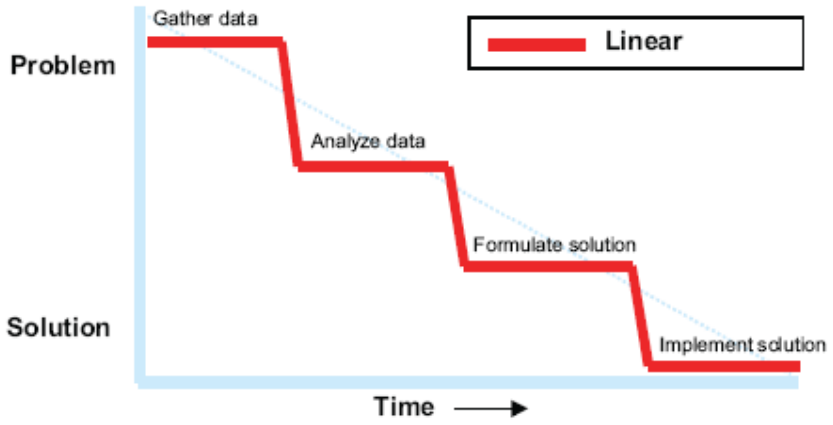
In looking at persistent barriers from a fresh angle, the researcher will take Tsoukas (2005:286) up on his challenge - she will attempt to make sense of why certain barriers to information and knowledge sharing persist:

"The creation of meaning out of what is noisy depends crucially upon the observer: on his/her willingness and ability to invent new codes in terms of which, what appears as noisy may be accounted for; what seems initially to be interference may be seen as part of a new signifying structure and, therefore, be integrated into a new level of understanding."

1.6 Significance of the study

If the proposal put forward in this study is supported, and a category of barriers prove to be rooted in the inherent nature of organisations, i.e. if they prove to be a 'wicked' mesh, it will explain why even 'Most Admired Knowledge Enterprises' are stuck with less than fluent information and knowledge flows. The usually employed approach for problem solving seldom - if ever - succeeds in addressing 'wicked' problems once and for all. Conklin (2008:5) depict the traditional 'top-down' problem solving process as follows:

Figure 1: Traditional wisdom for solving complex problems (Conklin: 2008:5)



If the mesh of barriers to fluent information and knowledge flows proves to be a complex, 'wicked' problem, the process depicted above will not address the issue, for reasons discussed in more detail further on.

Following from this point, an approach to IKM initiatives that is mindful of contextual realism is called for. As Chambers notes in the foreword to Ramalingam et al.'s (2008) study: "*realism means more modesty and more honesty.*" Particularly in the case of information and knowledge management - which many still see as "*a management fad, promulgated mainly by certain consultancy companies … [destined to] fade away like previous fads*" (Wilson, 2002) - it is important to communicate realistic expectations in terms of possible deliverables. If barriers to information and knowledge sharing present themselves in the organisation as a 'wicked' mesh, a sophisticated approach is called for

- an approach mindful of the fact that "*getting the right content to the right person at the right time*" (in the case of information sharing), and cultivating "*a common ecology that will sustain the creation, utilisation and retention of intellectual capital* (in the case of knowledge management) will be an arduous, ongoing effort. It is important for IKM practitioners and IKM business sponsors to understand that facilitating fluent information and knowledge flows will be an ongoing struggle - that it will remain an organisational 'pain point' that should stay on the agenda. If practitioners do not constantly intervene to mitigate persistent barriers, poor information and knowledge flows will become a 'numb point'. Roth (2008:4) warns:

"The symptoms have emerged so gradually and have been there so long that organizations have become numb to them and just treat any resulting inefficiency as business as usual."

Approaching IKM interventions from a better informed, more clear-sighted position allow practitioners to leverage tools and approaches geared towards mitigating the 'portfolio' of barriers they are likely to face in a more sophisticated way. Viewing organisations through a complex systems lens suggests tools, approaches and practices that are "*more attuned to reality, more sensitive to context, more adaptive, less reductionist and less simplistic.*" (Ramalingam et al., 2008:7) One example: an IKM practitioner mindful of the complex mesh of issues involved in facilitating information and knowledge flow would *not* proclaim any software solution to be the holy grail of information and knowledge sharing. The disillusion that often follows IKM interventions may be circumvented if we approach interventions with the realisation that barriers may be mitigated, but not entirely eliminated. Also, acknowledging the unique challenges of 'managing' information and knowledge in a complex environment may encourage more investment into maturing those interventions that are better-suited to such an environment.

The intention is further that insights derived from this specific case will contribute to the identification of a group of persistent barriers that are prone to crop up within organisations. It is envisioned that similar studies in MAKE award winning organisations in other sectors will corroborate (or contradict) the 'portfolio' of persistent barriers identified in this study, so that eventually patterns of to-be-expected barriers

emerge. Corresponding to Charmaz's (2006:126) description of interpretive theory, in this study "*priority [is given] to showing patterns and connections.*" Heifetz (2009:133) suggests that if we have access to case studies of successes and failures, we can start to "*develop heuristics [and] guides to asking the right questions.*"

While Richardson, Cilliers and Lissack (2001:13) remind us that the description of any particular 'problematic situation' will always be partial and provisional, they note that an assortment of perspectives could facilitate "*a richer appreciation of the 'state of affairs' or 'problematic situation'"*, which may enable more informed decision making. Using a complex systems 'lens' to frame unsatisfactory intra-organisational information and knowledge sharing as a 'wicked' problem can aid our understanding of a *'problematic situation'* within the knowledge management field, namely the actuality that IKM initiatives do not succeed in overcoming all barriers to sharing.

At the most this study can say that certain barriers are more likely than others to persist - not that they will undoubtedly occur in all organisations. However, following McKelvey in Baum and Rowley (2002:21) it is held that "*there is enough of an objective reality 'out there' that repeated attempts by various researchers, using a variety of generally approved methods of 'justification logic' eventually will discover the approximate truth of theories."* If common barriers are identified, understanding their fundamental nature can aid practitioners in developing good practice around behaviours and actions that can mitigate the impact of these barriers where they occur.

1.7 Delineation and limitations

1.7.1 Delineation

This focus of this study is intra-organisational, i.e. the focus is on the people, groups, knowledge, tools and tasks that make up organisations (Baum & Rowley, 2002:7), as well as intra-organisational processes. This study further focuses on organisations as complex *social* systems. It does not view organisations metaphorically as complex systems, i.e. it does not say organisations are like complex systems, it views organisations as a specific kind of complex system - a complex *social* system.

1.7.2 Limitations

1.7.2.1 Lack of exact predictability

"A theory does more than provide understanding or paint a vivid picture. It enables users to explain and predict events, thereby providing guides to action." *(Strauss and Corbin, 1998:25).*

Undeniably a theory that explains and accurately predicts barriers to information and knowledge sharing across all organisations would be extremely useful. Unfortunately we have to keep Cilliers' (1998:ix) admonition in mind, namely that *"if something is really complex, it cannot be adequately described by means of a simple theory*." From a complexity point of view the goal of "*predict[ing] (and thereby control[ling]) the behaviour of systems not yet studied (but similar to those that have been studied) under conditions not yet extant and in time periods not yet experienced*" is unattainable (Kurtz and Snowden, 2003: 464).

Since complex systems are unpredictable by nature, the insights generated by a study such as this will accordingly not give those responsible for IKM in their organisations "*the ability to foretell specific, well-defined events (in space and time), but, at best, the ability to foretell the range of possible behaviours the system might adopt"* (Van Uden, Richardson, & Cilliers, 2001:11).

1.7.2.2 Lack of computational metrics

Secondly, those who approach complex systems from a computational theory perspective will point out that this study focuses on *perceived* complexity, since no computational metrics of complexity theory are employed. Also, complexity concepts are not operationalised in this study. The approach that is followed is rather a 'loose' application of complexity to the particular complex system that is a human organisation, as advocated by researchers such as Van Uden (2005:62-65). This is because the language used in the hard sciences to discuss complex systems, i.e. mathematics, is not well-suited to offer 'thick' descriptions of systems. To understand organisational life, however, 'thick' descriptions of spatio-temporal specifics are required, descriptions that are not suited to being processed by computers. However, even when 'loosely' defined when applied to organisation studies, concepts from the study of complex systems add

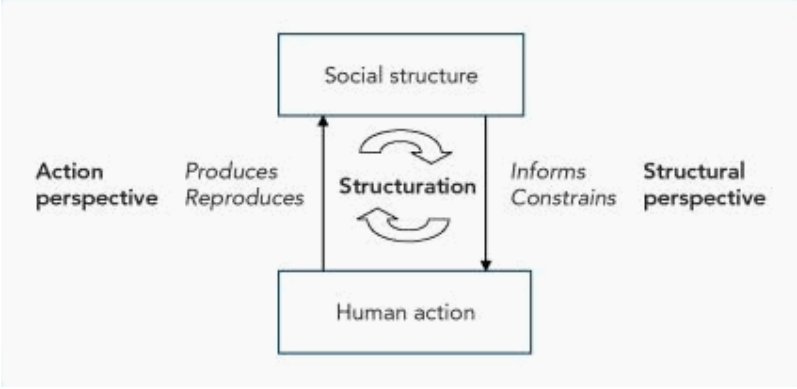
value to the study of human organisations by "*[enabling] us to call into existing a phenomenon that was inexpressible in our pre-existing language*" (Van Uden, 2005:65). Complexity concepts are thus seen as useful conceptual tools for aiding our understanding of why certain barriers to information and knowledge sharing persist in organisations, and for delimiting this specific category of barriers.

1.8 Explanation of terms and concepts

1.8.1 Organisations

Beynon-Davies (2002:11-12) describes an organisation as "*a social collective - a series of interdependent human activity systems - in which formal procedures are used for coordinating the activities of members in the pursuit of joint objectives.*" This definition touches on both the top down, institutional perspective of organisations as independent structures that direct the actions of their human employees, and the bottom-up, action perspective of organisations as the product of human actions and interactions. These perspectives were elegantly integrated in Anthony Giddens' structuration theory, which can be depicted as follows:

Figure 2: The process of structuration (Beynon-Davies, 2002:220)



In Beynon-Davies' definition, reference to *a series of interdependent human activity systems* signals that organisations are complex. Organisations are, to quote Boulding (in Weick, 2001:242), "*among the most complex systems imaginable. Organisations are vast, fragmented, and multidimensional.*" Listing only *some* of the interdependent elements that constitute organisations supports this view. They include applications,

agents, human activity systems, processes, strategies, roles, communication channels, culture, data, information, knowledge, informatics infrastructure, service, and more.

1.8.2 Information and knowledge

In the literature the terms 'information' and 'explicit knowledge' are often used synonymously. Authors commonly use wording similar to the NeLH's (2005) definition of the concept 'explicit knowledge' to connote the concept 'information':

"Information is knowledge that can be easily expressed in words or numbers, and can be shared through discussion or by writing it down and putting it into documents, manuals or databases."

A number of authoritative authors (Firestone & McElroy, 2003:13; Bordeaux, 2009; Tsoukas, 2005:119) contest the idea that knowledge can be easily and fully expressed in words or numbers, i.e. that knowledge can be converted into information. In an eloquently understated way, Cilliers (2002:80) suggests:

"We talk of a 'knowledge industry' and of 'knowledge management'. These terms create the impression that knowledge is something in which we can trade, independently of the subject that has the knowledge. In this way knowledge is reified, turned into something that 'exists', that can be put on a disk or a website. Of course, there are many things we can put on a disk, but perhaps one should reserve the terms 'data' or even 'information' for this."

Even Polanyi, who is widely credited with articulating the notion of tacit and explicit dimensions of knowledge, was reluctant to use the phrase 'explicit knowledge' to denote an independent entity, stating that knowledge is always an inextricable mix of tacit and explicit (Polanyi in Gourlay, 2004:91). Tsoukas, (2005:158) note that the tacit and explicit dimensions of knowledge are two sides of the same coin, and point out that while *some* of what individuals know may be surfaced through "*instructive forms of talk*" derived from reflecting on practical activities, the tacit dimension remains for the most part inexpressible. This is because an individual's tacit knowledge base is a shifting, 'composite construct' (Malhotra, 2002:583) that emerges from the dynamic interplay of personal judgements, habits of thinking, mental patterns of perception, pre-suppositions, framed experience, values, information, expert insights, intuitions, interpretations, traits such as creativity and commitment, and so forth (Tsoukas,

2005:104; Davenport & Prusak, 1998:5; Malhotra, 2002:583; Zack, 1999). De Botton (2005:48) cuts to the heart of the concept more prosaically when he says:

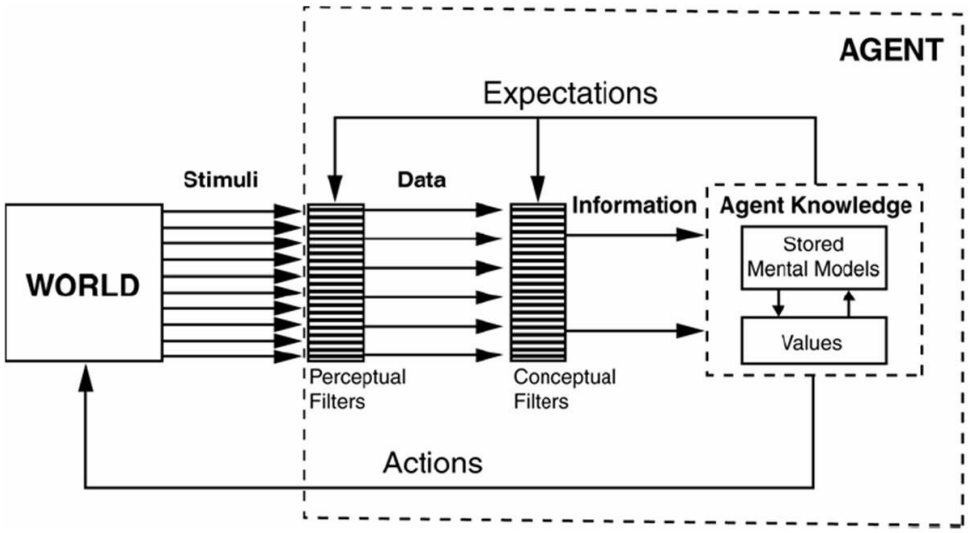
"Typically, the written account grazes the surface of an event, we see a sunset and later in the diary, fumble for something and call it 'beautiful' when we know it was a lot more, but the more can't be fixed and is soon forgotten. We want to capture what happened today, and so draw up a list of where we went and what we saw, but leave the page knowing that there were evanescent things that we have failed to describe, but which we suspect may hold the key to the reality of the day."

What the notion that knowledge can never be fully explicated implies is that what can be elicited from an employee is information, if done expertly rich and important information, but still information - lacking the inexpressible personal insight, i.e. the tacit dimension, that differentiates knowledge.[1]

Further, while there is no universally accepted definition of 'knowledge', the working definitions of a number of respected scholars and practitioners emphasize the nature of knowledge as an ongoing process rather than as a fixed 'thing'. Polanyi (in Gourley, 2004:91) argues that the phrase 'tacit knowing' is preferable to 'tacit knowledge', since knowing is "*an act of integrating …. thousands of clues [into a] comprehensive entity.*" Although widespread use of the phrase 'tacit knowing' has not taken root, the notion of knowledge as a process rather than a 'thing' has. Nooteboom (2001:3), for example, sees knowledge as an act of interpreting information into a cognitive framework, while McDermott (1999:105) sees it as a personal act of piecing information together, reflecting on prior experience, and generating insights to use in problem situations. Boisot and Canals (2004:9) depict knowledge as process as follows:

[1] Some authors try to escape the 'explicit knowledge' quagmire by introducing the concept 'implicit knowledge' as that which can be fully articulated but has not been articulated yet. The decisive point remains, namely that 'knowledge' cannot be articulated fully.

Figure 3: The Agent-in-the-World (Boisot & Canals, 2004:9)



The agent, by bringing his or her existing knowledge base and values to bear on information-bearing data (i.e. data that carries information about the physical world), extracts information from said data. Boisot and Canals' depiction tie in with Tsoukas, (1996:18) notion of knowledge as being path dependent:

"History leaves its marks on how actors see the world; every time we act, we do so by means of the habits of thinking we acquired through our past socializations. At any point in time, our habits of thinking have been historically formed through our participation into historically constituted practices*."*

Appreciative of the fact that tacit and explicit knowledge is 'mutually constituted' (Tsoukas' phrase), and that knowledge should be viewed as a process rather than a 'thing', Davenport and Prusak (1998:71) warn that "*trying to get down everything a skilled knowledge worker knows would be ... arduous and futile.*" For that reason theorists and practitioners with a sophisticated understanding of the concept 'knowledge' think twice before using concepts such as 'knowledge capture' and 'knowledge conversion'. However, while it's not possible to explicate *everything* an individual knows, explicating even *some* of what a true expert knows may be worth the effort. Tsoukas (2005:158) leaves us with a glimmer of hope in this regard: though an individual's knowledge cannot be 'captured' or 'converted' it may be *revealed* in his or

her actions. The challenge is to find "*fresh forms of interacting*" and "*novel ways of ... connecting*" to make what experts do - and their reflection on how they do things - visible to as wide an organisational audience as possible. This notion touches on the concept 'knowledge sharing', which will be considered shortly.

Von Baeyer (2004:25) notes that information too lacks a crisp and robust definition. He ventures a definition of information as the "*communication of [ideas and] relationships*", touching on both the colloquial and technical senses of the concept. He (2004:19) outlines the two senses as follows:

1. *The colloquial usage, as in 'personal information' and 'directory information, refers to the meaning of a message of some sort.*

2. *The technical usage emphasizes the symbols used to transmit a message, whether they are letters, numbers or the computer digits zero and one.*

1.8.2.1 Organisational knowledge

While the previous segment focused primarily on individual knowledge, the concept 'organisational knowledge' is also central in the IKM literature. Tsoukas (2005:120, 124) describes organisational knowledge as *a corpus of generalizations - in the form of generic rules - produced by the organisation, whose application depends on historically evolved collective understandings*." The 'generic rules' prescribe what employees in specific organisational roles should or should not do, in specific circumstances. What's more, employees as a group develop, through shared experience, a similar understanding of what the rules mean. The rules, however, are too general to effectively guide practice; hence employees supplement rules with examples, anecdotes and stories, i.e. narratives. Tsoukas (2005:88) unpacks organisational knowledge as follows:

*"*Propositional knowledge and narrative knowledge are the two ends of the spectrum of organizational knowledge*."*

1.8.3 Information and knowledge sharing

If we accept that "*knowledge is not stored, but perpetually constructed*" (Stacey, 2001:6) - more often than not at a point of need - the notion of 'externalising' (Nonaka

& Takeuchi, 1995:198) our knowledge becomes problematic. If we take knowledge to be an integrative process, it stands to reason that if knowledge is to be shared, it would require the 'sharer' to articulate the elements integrated, and the reasoning behind why it is integrated in a particular way (Polanyi in Gourlay, 2004:92). McDermott's (1999:107) definition of knowledge sharing as the act of "*guiding someone through our thinking*" captures this notion of knowledge sharing as a kind of cognitive parallel processing. This complex process calls for extended personal contact, for example through coaching or mentoring, where the novice can observe and be guided by the expert. It brings us back to Tsoukas' (2005:158) assertion that an individual's knowledge cannot be 'captured' or 'converted', only revealed in what he or she does.

Thus, 'knowledge sharing' can at best be seen as a demanding and time-consuming activity that requires individuals to surface their thought processes. Since sub- and preconscious intuitions (Spender, 1996:50) enter into the knowing process, true 'knowledge sharing' can at worst be seen as a pipe dream, since individuals cannot share what they do not know they know! Use of the concept 'knowledge sharing' in this study accordingly comes with the caveat that individuals can never share *all* they know. What typically happens is that individuals, leveraging what they already know, construct *new* knowledge in unison through communicative interactions - what Stacey (2001:9) calls "*complex responsive processes of relating.*" Gourlay (2004:101), among others, maintains that this less-than-perfect knowledge sharing suffices, since even incomplete codification can act as a catalyst to "*orient novices' attention to the extent that they can develop adequate rules themselves through doing.*"

For the purpose of this study it is further useful to distinguish between information and knowledge sharing, and reporting. The difference revolves around the notion of volition, which Davenport and Prusak outline as follows: *"... the voluntary act of making information available to others. Sharing should be distinguished from reporting, which is involuntary exchange of information on a routine or structured basis."* If we follow this definition of information sharing, and integrate McDermott's definition of knowledge sharing quoted above, we can define knowledge sharing as *the voluntary act of guiding someone through our thinking*.

1.8.4 Barrier

For the purpose of this study a barrier is defined as "*any condition or structure that impedes free movement, making it difficult to make progress or to achieve an objective.*" (WordNet) In the context of this study the focus is on those conditions or structures that impede the sharing of information and knowledge within organisations. Moreover, this study focuses specifically on *persistent* barriers, i.e. barriers that continue to exist - that refuse to be surmounted (Wordnet).

1.8.5 "Wicked problem"

As mentioned this study foresees that persistent barriers to information and knowledge sharing are of a special class termed 'wicked problems'. The concept is clarified in the literature using ten properties, which will be addressed in the literature review. To summarise, wicked problems occur in a social context, they can't be resolved by traditional processes in a fixed time, they have innumerable causes, are tough to describe, and can be identified by the confusion, discord and lack of progress they create. (Camillus, 2008:100)

1.9 Brief chapter overviews

In chapter one the research questions and rationale for the study are presented. Chapter two reviews the literature with particular focus on two broad streams of research, namely barriers to information and knowledge sharing, and complex social systems. In chapter three the method for studying persistent barriers is presented. Chapter four presents the data and discusses the association between persistent barriers and the attributes of complex systems. Chapter five concludes the study with a brief summary of the findings, a discussion of the implications of the findings for practice, and suggested areas of further research.

Chapter 2
Literature review

2.1 Introduction

This chapter will critically review existing literature pertaining to information and knowledge management and complex social systems.

2.1.1 Sources used in the literature review

To get a clear understanding of the themes being considered a comprehensive literature review guided the study. The search engines Google and Bing (formerly Live) and the meta-search engines Clusty and jux2 were used to identify literature available via the open Web. The commercial databases EBSCOhost, Emerald, General Business File International, J-Stor, Gartner, ScienceDirect and Ingenta were used to identify articles in proprietary journals. Multi-disciplinary databases were included to facilitate inclusiveness. To discover relevant information within books library catalogues, Google Book Search and Amazon's 'Search Inside This Book' feature were used. To find theses on aspects of the topic the digital open content repositories DAREnet, NDLTD, Social Science Research Network and OAIster were used. To stay up to date with expert opinion a number of blogs and discussion forums were tracked via the Bloglines feed aggregator, and a selection of alerts was set up using Google Alerts.

Themes that were explored include enterprise information and knowledge management, information and knowledge sharing, barriers to sharing, complex adaptive systems, and complex systems within the context of IKM.

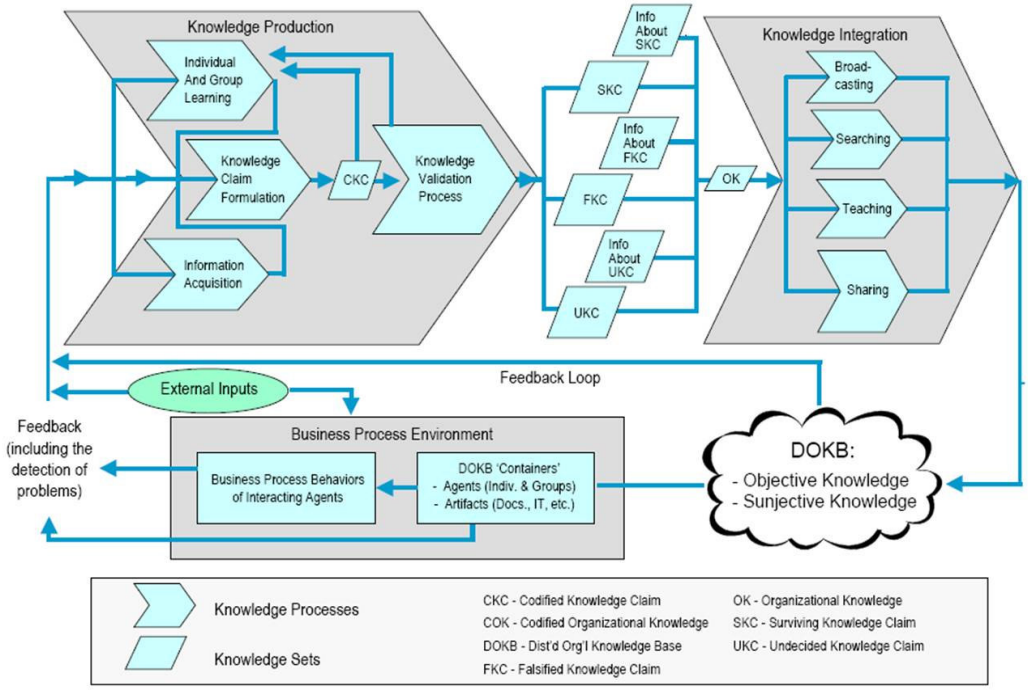
2.2 Enterprise information and knowledge management (IKM)

Knowledge management can be described as management activity that focuses on those interventions - social and technological - that facilitate the cultivation and maintenance of an organisational ecology that is conducive to knowledge creation and sharing, in order to support the achievement of organisational goals. If, as discussed earlier,

knowledge is seen as an act or process of interpretation and integration that is narrowly tied to cognition, the concept knowledge *management* is a misnomer, since a cognitive act cannot be 'managed' in the established sense of the word. Appreciative of the fact that knowledge as such cannot be managed, a more sophisticated understanding of the concept 'knowledge' has led to a realisation that organisational knowledge management's true focus is the creation of "*self-sustaining [organisational] ecologies*" (Snowden, 1999:9) that support employees' information and knowledge creating- and sharing efforts. In Snowden's (1999:12) own words: *"The active management of intellectual assets is the creation of management processes and infrastructure to bring together artefacts and communities in a common ecology that will sustain the creation, utilisation and retention of intellectual capital."* This comes with the caveat that an ecology can never be 'engineered' - its evolution can merely be influenced.

In a similar vein, Firestone and McElroy (2002:9) describe knowledge management as a management activity that seeks to enhance individual and organisational knowledge processing. The representation below emphasise the two key activities (and their sub-processes) that constitute knowledge processing, namely knowledge production (more often termed knowledge creation in the KM literature) and knowledge integration (more often termed knowledge sharing in the KM literature). Knowledge processing is the key activity within the organisational Knowledge Life Cycle (KLC). Firestone and McElroy emphasise that neither knowledge production nor knowledge integration, or any of the sub-processes amount to knowledge management. Only those activities aimed at improving knowledge processing, i.e. those which facilitate the progress of information and knowledge through the KLC, can be termed knowledge management.

Figure 4: The Knowledge Life Cycle (KLC) (Firestone, 2003:30)



Snowden, as well as McElroy and Firestone, among others, point out that their approach to knowledge management supersedes that of earlier 'generations' of KM. Snowden labels his view "*3rd generation knowledge management*", while Firestone and McElroy (2003:12) label theirs "*the new knowledge management.*" Dixon (2009) unpacks the 'generations' of knowledge management as follows, noting that a new generation does not completely supplant earlier ones, but builds on it:

First generation KM was set in motion around the early nineties with Peter Drucker's thoughts on the knowledge-based economy. A view of knowledge as an organisational asset that had to be managed as such emerged. The focus was on 'capturing knowledge' and sharing it by means of information technology. Initially the notion of 'knowledge capture' was not regarded as problematic, but in due course it became apparent that "*the important knowledge that was in people's heads*" defied conversion (Nonaka and Takeuchi's term) into 'explicit' form. Second generation KM, according to Dixon, focused on the exchange of dynamic, context-specific knowledge that resides in people's heads, and the preferred medium for facilitating this exchange was

communities of practice (CoP). Dixon notes that the third generation is currently underway, and that its focal point is leveraging collective knowledge through joint sensemaking. For Snowden, as well as McElroy and Firestone, the distinguishing feature of third generation or new knowledge management is an understanding of how complex adaptive systems phenomena permeate organisations, and how knowledge management interventions has to be "*synchronised with CAS phenomena in order to succeed.*"

In practice an information management initiative will often form part of a knowledge management initiative (and 'pure' information management initiatives are frequently erroneously termed 'knowledge management'). The concept 'information management' is less contested than that of 'knowledge management', and most definitions of information management correspond to the one found in the TFPL glossary, describing it as "*an umbrella term for the various activities that contributes to the effective production, co-ordination, storage, retrieval, and dissemination of information.*" Schenk (2008), in agreement with a growing number of IKM practitioners, propose that organisational knowledge management initiatives more often than not include better information management on the one hand, and improved collaboration and learning on the other. Shenk's equation makes it clear that there is a 'people' and 'process/practice' component to IKM:

Knowledge strategy = Information Management + [Collaboration and Learning]

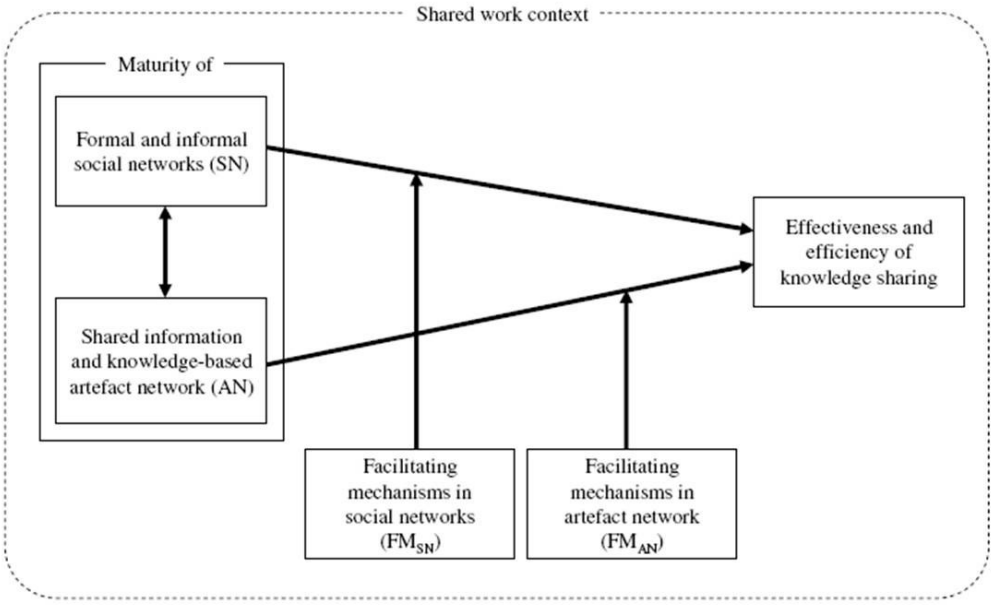
This ties in nicely with Snowden's notion of self-sustaining [organisational] ecologies that enable and sustain knowledge creation and sharing mentioned above, since ecologies - in contrast to environments - deals with the relationships of organisms with their environment *and with each other.*

2.3 Information and knowledge sharing

While numerous articles extol the virtues of information and knowledge sharing, there is a dearth of articles that attempt to clarify what it entails. One notable exception is Bosua and Scheepers' (2007:93-109) model for explaining knowledge sharing in complex organisational environments. They propose two elements, situated within a

shared work context, as requisites for effective knowledge sharing, namely (1) formal and informal social networks and (2) a shared information and knowledge based artefact network. In addition to these two elements facilitating mechanisms need to be in place. These include mechanisms that link the social network with the artefact network (such as a modern ICT infrastructure), facilitating mechanisms in social networks (i.e. mechanisms that seek to foster people-to-people knowledge sharing, e.g. incentives and knowledge roles), and facilitating mechanisms in artefact networks (such as metadata- and Web standards).

Figure 5: Bosua and Scheepers' proposed knowledge sharing model



Van den Hooff and De Ridder (2004:118), in their study of factors that promote or impede knowledge sharing, define knowledge sharing as "*the process where individuals mutually exchange their knowledge and jointly create new knowledge.*" They identify two processes central to knowledge sharing:

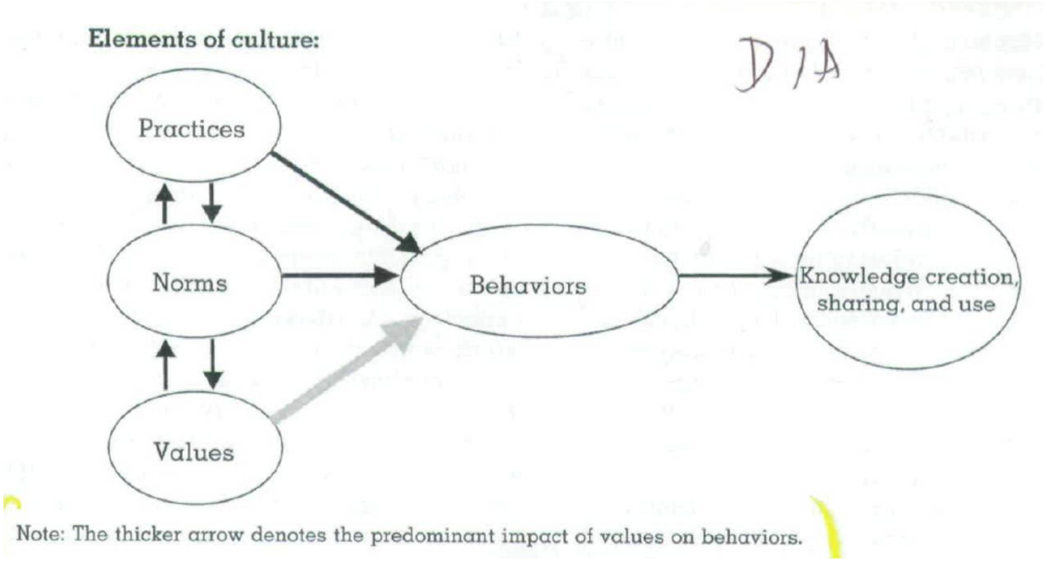
1. *Knowledge donating, i.e. communicating to others what one's personal intellectual capital is, and*

2. *Knowledge collecting, i.e. consulting colleagues in order to get them to share their intellectual capital*

Grey (2004) points out that knowledge sharing is about more than just access. In terms of Van den Hooff and De Ridder's central processes, knowledge donating requires an employee to invest effort to make sure a colleague truly understands and makes sense of what is shared. Knowledge collecting, on the other hand, requires the recipient of expert insight to actively engage in a process of listening and learning. The parties involved in knowledge sharing need to be willing to engage in deep dialog, including providing context, articulating feedback, and being open to having their contributions assessed critically.

De Long and Fahey, (2000:116) taking one step back, point out that employees' behaviour with regards to knowledge sharing is influenced by organisational culture as reflected in organisational practices, norms and values. They (2000:126) recommend taking diagnostic action steps to identify the facets of organisational culture not conducive to information and knowledge sharing, and, upon completion of the analysis, "*to accommodate or realign the firm's culture to effectively support management's goals for leveraging organisational knowledge."* Tsoukas (2005:106-107) points out two possible curveballs relevant to this recommendation: one, that "*at any point in time what is going on in a social system is not only not fixed but is inherently indeterminate*", and two, that organisational "*normative expectations are extremely unlikely to be identical to an individual's habitus.*" Thus an organisation's culture may change of its own accord, for example when a recession hits and employees are made redundant.

Figure 6: Culture elements influence behaviours (De Long and Fahey, 2000:116)



2.4 Barriers to information and knowledge sharing

While few studies have focused exclusively on barriers to information and knowledge sharing, numerous articles and case studies mention some factors that are detrimental to fluent information and knowledge flows. As mentioned earlier, the most comprehensive studies to date that focus primarily on barriers are Riege's 2005 study that identifies three-dozen knowledge sharing barriers, and Szulanski's 2003 study identifying the barriers to knowing in the firm.

In his study Riege (2005:23-29) categorises the barriers he identified by means of a comprehensive literature review into three domains: individual/personal, organisational and technological. He points out that the categories are not mutually exclusive, but that some barriers permeate multiple categories. Individual barriers include, for example, a lack of time to share knowledge, a lack of trust in people and a lack of social networks; organisational barriers include a shortage of space to share knowledge, an organisational culture that does not support knowledge sharing practices and a hierarchical organisational structure that inhibits knowledge sharing practices; technological barriers include a lack of technical support, a lack of compatibility between diverse IT systems and a lack of training regarding IT systems.

Szulanski (1999:7) categorises the barriers to knowledge transfer he identifies against a four-phase process of knowledge transfer, which comprises initiation, implementation, ramp-up and integration. Some of the barriers he identifies include a source that lacks motivation, a recipient that lacks motivation, perception of a source as non-reliable, an arduous relationship between the source and recipient, and a lack of absorptive capacity on the part of the recipient.

Barriers to information and knowledge sharing mentioned in IKM literature include the following:

Table 1: Barriers to information and knowledge sharing

Barriers to information and knowledge sharing mentioned in IKM literature	Source
Lack of resources - time	**Davenport**, T.H. & Prusak, L. 1998. *Working knowledge: how organizations manage what they know*. Boston, MA: HBS Press.
Lack of rewards for knowledge creation	**Jarvenpaa**, S.L. & Staples, D.S. 2001. Exploring perceptions of organizational ownership of information and expertise. *Journal of management information systems*, 18 (1): 151-183.
Lack of a knowledge- and/or information management strategy	**Garvin**, D.A. 1993. Building a learning organization. *Harvard Business Review,* July-August: 78-91.
Failure to embed IKM initiatives into individuals' daily work activities	**McDermott**, R. & O'Dell, C. 2001. Overcoming cultural barriers to sharing. *Journal of Knowledge Management*, 5(1): 76-85.
Lack of leadership and managerial direction with regard to IKM initiatives	**Michailova**, S. & Husted, K. 2003. Knowledge sharing hostility in Russian firms. *California management review*, 45(3): 59-77.
Information hoarding	**Michailova**, S. & Husted, K. 2003. Knowledge sharing hostility in Russian firms. *California management review*, 45(3): 59-77.
Inter-group competition	**Simard**, C. & Rice, R.E. 2003. *The practice gap: barriers to the diffusion of best practices.* [Online]. Available: http://www.odl.rutgers.edu/resources/pdf/diffusion.pdf [15 August 2009].
Lack of information and/or knowledge roles	**Stewart**, T.A. 1998. Is This Job Really Necessary? *Fortune*, 137(1): 154-155.

Barriers to information and knowledge sharing mentioned in IKM literature	Source
Lack of a holistic approach to information flows	**Parlby**, D. 1999. *KPMG knowledge management research report 2000* [Online]. Available from: http://www.scribd.com/doc/7067646/km2000 [15 August 2009].
Mistakes not seen as learning opportunities but as opportunities for assigning blame	**Manzer**, F. 2006. The impact of fear on project success. *ASK magazine*, Summer: 42-44. [Online]. Available: http://askmagazine.nasa.gov/pdf/pdf24/NASA_APPEL_ASK24i_impact.pdf [15 August 2009].
Inappropriate reward system	**Simard**, C. & Rice, R.E. 2003. *The practice gap: barriers to the diffusion of best practices*. [Online]. Available: http://www.odl.rutgers.edu/resources/pdf/diffusion.pdf [17 Dec 2005].
Lack of rewards for information sharing	**McDermott**, R. & O'Dell, C. 2001. Overcoming cultural barriers to sharing. *Journal of Knowledge Management*, 5(1): 76-85.
Multiple, disparate systems and databases characterized by a lack of shared standards	**Knox**, M. 1999. Q&A: technology and organizational silos as CIMA barriers. *Gartner research* (QA-09-7625).
Organisational culture inhibiting knowledge creation and information sharing	**Riege**, A. 2005. Three-dozen knowledge sharing barriers managers must consider. *Journal of knowledge management*, 9(3): 18-35.
Lack of contact among individuals who don't work side-by-side	**Friedkin**, N.E. 1983. Horizons of observability and limits of informal control in organisations. *Social forces*, 62(1): 54-77.
Lack of resources - financial	**Kay**, S. 2003. *Cost, value and ROI for knowledge management in law firms*. [Online]. Available: http://www.llrx.com/features/kmcost.htm [18 March 2006].
Attitudes of individual employees	**Cabrera**, A. & Cabrera, E.F. 2002. Knowledge sharing dilemmas. *Organization studies*, 23(5): 687-710.
Individuals underestimating the value of what they know	**Cabrera**, A. & Cabrera, E.F. 2002. Knowledge sharing dilemmas. *Organization studies*, 23(5): 687-710.
Lack of a formal process in place for implementing worthwhile ideas	**Bontis**, N., Crossan, M., & Hulland, J. 2002. Managing an organizational learning system by aligning stocks and flows. *Journal of Management Studies*, 39(4): 437-69.
Lack of awareness of the location of potentially useful information	**Davenport**, T.H. & Prusak, L. 1998. *Working knowledge: how organizations manage what they know*. Boston, MA: HBS Press.
Lack of individual knowledge creation and sharing competencies	**Bhagat**, R.S., Kedia, B.L., Harveston, P.D. & Triandis, H.C. 2002. Cultural variations in the cross-border transfer of organizational knowledge: an integrative framework. *Academy of management review*, 27(2): 204-221.
Lack of opportunity to take ideas forward	**Fliaster**, A. 2004, Cross-hierarchical interconnectivity: forms, mechanisms and transformation of leadership culture. *Knowledge management research & practice*, 2: 48-57.

Barriers to information and knowledge sharing mentioned in IKM literature	Source
Challenges to deeply ingrained organisational routines and assumptions discouraged	**Simard**, C. & Rice, R.E. 2003. *The practice gap: barriers to the diffusion of best practices*. [Online]. Available: http://www.odl.rutgers.edu/resources/pdf/diffusion.pdf [17 Dec 2005].
Confidentiality considerations	**Nooteboom**, B. 2001. Problems and solutions in knowledge transfer. *Paper for the conference on "The influence of co-operation, networks and institutions on regional innovation systems"*, Max Planck Institute, 8-10 February 2001.
Lack of indicators to prove the bottom-line benefit of systematic IKM	**Fahey**, L. & Prusak, L. 1998. The eleven deadliest sins of knowledge management. *California management review*, 40(3): 265-276.
Poor targeting of information	**Morrissey**, S. 2005. *The design and implementation of effective knowledge management systems*. [Online]. Available: http://mackcenter.wharton.upenn.edu/ford/Morrissey%20-%20Knowledge%20Mgt.pdf [15 August 2009].
Fear of criticism	**Ardichvili**, A., Page, V. & Wentling, T. 2003. Motivation and barriers to participation in virtual knowledge sharing communities of practice. *Journal of knowledge management*, 7(1): 64-77.
Information overload	**Kirsh**, D. 2000/1. A few thoughts on cognitive overload. *Intellectica*, 30: 19-51.
Not-invented-here syndrome	**Katz**, R. & Allen, T.J. 1982. Investigating the not invented here (NIH) syndrome: a look at the performance, tenure, and communication patterns of 50 R&D project groups. *R&D Management*, 12(1): 7-19.
Lack of trust in fellow employees	**Wang**, R. & Rubenstein-Montano, B. 2003. The value of trust in knowledge sharing. (*In* Coakes, E. *Knowledge management: current issues and challenges*. Hershey, PA: IRM Press. p. 116-130.)
A hierarchical organisational structure	**Fliaster**, A. 2004, Cross-hierarchical interconnectivity: forms, mechanisms and transformation of leadership culture. *Knowledge management research & practice*, 2: 48-57.
Technology ill understood	**Pollard**, D. 2005. *The psychology of information, or why we don't share stuff*. [Online]. Available: http://blogs.salon.com/0002007/2005/09/19.html [15 August 2009].
Absence of proof of usefulness of knowledge	**Szulanski**, G. 2003. *Sticky knowledge: barriers to knowing in the firm.* London: SAGE.
Required knowledge cannot be captured and codified	**Nooteboom**, B. 2001. Problems and solutions in knowledge transfer. *Paper for the conference on "The influence of co-operation, networks and institutions on regional innovation systems"*, Max Planck Institute, 8-10 February 2001.
Groupthink	**Hislop**, D. 2005. *Knowledge management in organizations: a critical introduction*. Oxford: Oxford University Press.

Barriers to information and knowledge sharing mentioned in IKM literature	Source
Individuals' lack of commitment to the organisation	**Van den Hooff**, B. & De Ridder, J.A. 2004. Knowledge sharing in context: the influence of organizational commitment, communication climate and CMC use on knowledge sharing. *Journal of knowledge management*, 8(6):117-130.
Individuals' lack of motivation to share knowledge and information	**Davenport**, T.H. & Prusak, L. 1998. *Working knowledge: how organizations manage what they know*. Boston, MA: HBS Press.
Lack of management commitment to facilitating information flows	**Curley**, K.F. & Kivowitz, B. 2001. *Manager's pocket guide to knowledge management*. Amherst, Mass.: HRD Press.
Authority and status hierarchies	**Pollard**, D. 2005. *The psychology of information, or why we don't share stuff*. [Online]. Available: http://blogs.salon.com/0002007/2005/09/19.html [15 August 2009].
Strained relationships between individuals	**Kolekofski**, K.E. & Heminger, A.R. 2003. Beliefs and attitudes affecting intentions to share information in an organizational setting. *Information & management*, 40: 521-532.
Individuals' lack of motivation to acquire knowledge and information	**Dixon**, N.M. 2004. Does your organization have an asking problem: a step-by-step process to capture and reuse project knowledge. *KM review*, 7(2): 18-23.
Expression of conflicting points of view discouraged	**Muller-Merbach**, H. 2004. Creative conflict. *Knowledge management research & practice*, 2: 129-130.
Lack of physical space for knowledge creation and sharing	**Leonard**, D.A. & Swap, W.C. 1999. *When sparks fly: igniting creativity in groups*. Boston, MA: HBS Press.
Complexity of the information or knowledge to be transferred	**Rynes**, S.L., Bartunek, J.M. & Daft, R.L. 2001. Across the great divide: knowledge creation and transfer between practitioners and academics. *Academy of management journal*, 44 (2): 340-355.
Too much cognitive distance between individuals	**Nooteboom**, B. 2001. Problems and solutions in knowledge transfer. *Paper for the conference on "The influence of co-operation, networks and institutions on regional innovation systems"*, Max Planck Institute, 8-10 February 2001.
Lack of individual absorptive capacity	**Boisot**, M. & Canals, A. 2004. *Data, information and knowledge: have we got it right?* [Online]. Available: http://www.uoc.edu/in3/dt/20388/index.html [15 August 2009]
Lack of group or organisational absorptive capacity	**Cohen**, W.M. & Levinthal, D.A. 1990. Absorptive capacity: a new perspective on learning and innovation, Administrative science quearterly, 35: 128-152.

Barriers to information and knowledge sharing mentioned in IKM literature	Source
Size of organisation	**Edmondson**, A. & Detert, J. 2006, *Do I dare say something? Harvard Business School Working Knowledge.* [Online]. Available: http://hbswk.hbs.edu/item.jhtml?id=5261&t=organizations [15 August 2009]
Cognitive dissonance	**Burkes**, B. & James, H. 1995. Culture, cognitive dissonance and the management of change. *International journal of operations and production management*, 15(8): 14-33.
Real or anticipated lack of reciprocity	**Bock**, G., Zmud, R.W., Kim, Y. & Lee, J. 2005. Behavioral intention formation in knowledge sharing: examining the roles of extrinsic motivators, social-psychological forces, and organizational climate. *MIS Quarterly*, 29(1): 87-111.
Knowledge is context-specific	**Van de Ven**, A.H. 2004. The context-specific nature of competence and corporate development. *Asia Pacific Journal of Management*, 21: 123-147.
Language - jargon	**Reagans**, R. & McEvily, B. 2003. Network structure and knowledge transfer: the effects of cohesion and range. *Administrative science quarterly*, 48: 240-267.
Information shared in inappropriate format	**Rynes**, S.L., Bartunek, J.M. & Daft, R.L. 2001. Across the great divide: knowledge creation and transfer between practitioners and academics. **Academy of management journal**, 44 (2): 340-355.
Language - cross lingual information sharing	**Reagans**, R. & McEvily, B. 2003. Network structure and knowledge transfer: the effects of cohesion and range. *Administrative science quarterly*, 48: 240-267.
Individuals' preference to share information with others of similar ethnicity	**Moss Kanter**, R. 2004. Changing organizational structures: an interview with Rosabeth Moss Kanter. *Academy of management executive*, 18 (2): 96-105.
Ethnic culture	**Bhagat**, R.S., Kedia, B.L., Harveston, P.D. & Triandis, H.C. 2002. Cultural variations in the cross-border transfer of organizational knowledge: an integrative framework. *Academy of management review*, 27(2):204-221.
Individuals' preference to share information with others of similar gender	**Moss Kanter**, R. 2004. Changing organizational structures: an interview with Rosabeth Moss Kanter. *Academy of management executive*, 18 (2): 96-105.

While Riege (2005:23-29) notes that "*many barriers are intertwined. That is, it is most likely that different combinations of knowledge-sharing barriers would be found in organisations*", no authors could be found who focus on the implications of viewing information and knowledge sharing barriers as interacting meshes. Also, as will be

discussed in more detail in the next section, barriers more often than not cross boundaries of category.

2.5 'Wicked problems'

This study proposes that, if persistent barriers to information and knowledge are inextricably wrapped up in the nature of organisations as complex social systems, poor information and knowledge flows can best be made sense of as a 'wicked problem'. A number of authors have explored intractable problems found in the complex social domain. In 1973 Rittel and Webber, writing from a social policy perspective, coined the phrase 'wicked problems' to distinguish between the complex problems found in social systems and the 'tame' problems natural scientists and engineers routinely focus on. The authors (1973:161) identified ten distinguishing properties of wicked problems. Below are summaries by Norton (2005:132-135) and Camillus (2008:101):

- *There is no definitive formulation of a wicked problem. No well-defined, exhaustive formulation that contains all the information the problem-solver needs for understanding and solving the problem can be articulated.*

- *Wicked problems have no stopping rule. There are no criteria to tell when the solution has been found and work on the problem can be stopped. There is always a chance that a better solution can be found.*

- *Solutions to wicked problems are not true or false, but good or bad. The solution chosen is largely a judgement call.*

- *There is no immediate and ultimate test of a solution to a wicked problem. With an ordinary problem it is possible to implement a solution and immediately tell if it is working or not. With a wicked problem, any solution, after being implemented, will generate waves of consequences over a virtually unbounded period of time. The consequences may yield utterly undesirable repercussions which outweigh the intended advantages.*

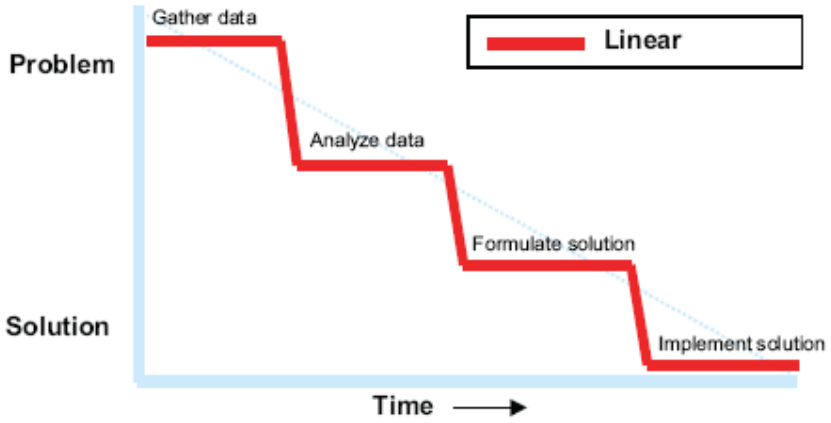
- *Every solution to a wicked problem is a 'one-shot' operation, since every attempt counts significantly. Every implemented solution has consequences that cannot be undone.*

- *Wicked problems do not come with a limited set of potential solutions.*

- *Every wicked problem is essentially unique.*
- *Every wicked problem is entangled with other problems.*
- *Different stakeholders will have different ideas about what the wicked problem really is and what its causes are.*
- *Problem solvers dealing with wicked problems are held liable for the consequences of the actions they take, because their actions will have such a large impact.*

If we reconsider Conklin's (2008:5) model in the light of the aforementioned attributes, we get an inkling why organisations struggle to 'solve' the problem of poor information and knowledge flows.

Figure 7: Revisiting traditional wisdom for solving complex problems (Conklin: 2008:5)



To highlight just a few issues concerning problem solving in a complex space:

When gathering information to find out why information and knowledge moves through the organisation only haltingly, different stakeholders will have different ideas about what the issues and the causes thereof really are. For those viewing persistent barriers through a technology lens, the problem lies with the myriad unconnected repositories within the organisation, or the lack of a suitably sophisticated social software application within the firm, and so forth. For those looking through a human resource

management lens, the problem lies with a lack of - or inappropriate - incentives, or the 'new generation' entering the workforce, and the like. For those concerned with learning and education, a lack of personal information and knowledge management skills is the culprit. Information managers, on the other hand, blame the lack of organisational metadata- and vocabulary standards.

Also, when gathering information it is problematic to determine what is pertinent to the problem and what not, since the "*boundaries of [complex] systems are constructions that we impose in order to reduce the complexity.*" (Cilliers, 2002:81) Goings-on in the external environment may significantly impact intra-organisational information and knowledge flows. A global financial downturn, for example, may limit an organisation's spending on knowledge roles and -infrastructure.

When it comes to analysing the information gathered things are also bound to go pear-shaped. Any attempt to "*resolve [the issue] into its elements*" (Wikipedia) will be counterproductive, since "*every wicked problem is entangled with other problems.*" Each constituent issue sits on top of its own complex causal network of sub-issues. To bring up just one example, the unconnected repositories issue is commonly underpinned by a more fundamental issue, namely the silo mentality found in many organisations, which translates into technology silos (Knox, 1999:2). In the organisation - which comprises a complex socio-technical system - the technological element and cultural element are entangled. To paraphrase Rittel and Webber (2003:163), the trouble really lies somewhere in the complex causal network.

Since different stakeholders hold different ideas about what the issues are, and an organisational silo mentality more often than not stands in the way of a coordinated effort, attempts at formulating a 'solution' will bring problems of its own. Furthermore, it's practically impossible to tell when a 'true', optimal 'solution' to poor information and knowledge flows has been found - i.e. when the best possible organisational ecology for information and knowledge sharing has been cultivated - since an organisational ecology is constantly transforming, and new tools, techniques and insights are continuously evolving.

We mentioned that where regular problems are concerned a solution can be pinpointed, implemented, and evaluated in terms of effectiveness. However, when it comes to wicked problems, any solution may generate unintended and undesirable consequences which outweigh the intended advantages. IKM practitioners are no strangers to the unintended consequences their interventions regularly produce: 'knowledge repositories' - while working well individually - overwhelm employees when amassed. Or content rating systems, introduced to surface quality content, discourage employees who do not consider their contributions 'expert enough'. In addition, *every implemented solution has consequences that cannot be undone*. When a well-publicised IKM intervention fails to deliver for example, business sponsors may find themselves in the Trough of Disillusionment (Gartner Inc's term). While the consequences are not entirely insurmountable, sponsorship for the next intervention may not be quite so forthcoming.

2.6 Complex systems

Complexity is complex. (Cilliers, 1998:9)

Cilliers (1998:2-5) remarks that defining 'complexity' is no straightforward task and that it is more viable to give a general description of complex systems by way of distinguishing characteristics. Accordingly he outlines ten key characteristics of complex systems:

2.6.1 Characteristics of complex systems

2.6.1.1 Complex systems consist of a large number of elements or components

These elements may include individuals/agents, organisations, systems of artefacts/resources such as information technology, and intellectual systems of ideas (Mitleton-Kelly, 2003:26-27). Carley (2002:212) adds to the list sub-groups, tasks and processes, while Clegg et al. (2006:166) mention decisions and value chain activities in addition to "mind-engendered processes" such as languages or instructions.

Important to note is that the elements constituting complex systems can be complex systems themselves. An obvious example particularly relevant to this study would be

complex human systems where the human 'elements' are "*adaptive agents guided by internal models or schemata.*" (Clegg et al., 2006:166)

2.6.1.2 The large number of elements interact dynamically

According to Krippendorff (1986) 'dynamic' refers to "*an attribute emphasising motion, change, and process as opposed to 'static'*." Dynamic interaction within the system accordingly means that complex systems characteristically change, adapt and evolve (Carley, 2002:209). A constant exchange of information would, for example, constitute 'dynamic interaction' for Cilliers. Dynamic interaction not only takes place among the elements of a system (such as different business groups within an organisation), but also among the dimensions of a system (such as the cultural, technological, financial and political dimensions of an organisation), *and* between a system and its environment.

2.6.1.3 The dynamic interaction between the elements is rich, i.e. the route from one element to another can usually be covered in a few steps

Also, individuals interact with many others in the context of their various capacities. This phenomenon, that "*any pair of individuals, on the average, is connected by a fairly short chain of social acquaintances*" (Ghosh, 2007:372), is referred to in the literature as the 'small world effect' (Johnson, 2007:100), or in popular parlance as 'six degrees of separation'.

2.6.1.4 The interactions are non-linear

Andriani (2003:128) identifies two aspects to this non-linearity: firstly, there is no direct proportionality between input and output in cause-effect relationships, which means small causes can have large effects and the other way around (Cilliers, 1998:4). Secondly, the behaviour of a complex system does not equate to the sum of the behaviours of its constituent elements. Accordingly, higher level properties at a systems level emerge from the intricate interactions of constituent elements, without being the sum total of constituent level/lower-level properties (Sawyer, 2005:2).

2.6.1.5 The interactions usually have a fairly short range, i.e. the elements in a complex system usually interact primarily with those around them

Cilliers emphasises that this 'local determination' (Lyotard's term) does not mean that groups of locally interacting elements are totally isolated from other locally interacting groups. The *influence* of locally determined groups can reverberate throughout a complex system. Johnson (2007:13) further points out that agents may interact because they are physically close to each other, but it may also be because they share membership of some group, or because they share some common information.

2.6.1.6 There are positive and/or negative feedback loops in the interactions

Maruyama (1963:164) describes negative feedback loops as deviation-counteracting or self-regulating, i.e. systems that responds to perturbation in the opposite direction as the perturbation (Wikipedia). Positive feedback loops (also referred to as reinforcing loops or 'vicious/virtuous circles'), on the other hand, are described as deviation-amplifying, i.e. systems that respond to perturbation in the same direction as the perturbation (Wikipedia). While negative feedback promotes stability in a system by counteracting change, positive feedback promotes system change (Dressler, 2008:50).

2.6.1.7 They are usually open systems

Open systems are not "*sealed off from the world at large*"; they interact with and can be influenced by other systems, which includes their environment (Gribben, 2005:104). Interaction here typically involves a flow of information, matter and/or energy (Sawyer, 2005:17).

2.6.1.8 Complex systems operate under conditions far from equilibrium

In Johnson's (2007:3) terms - "*anything can happen*" - i.e. phenomena which are surprising may unexpectedly emerge. This is because, in systems that are far from equilibrium, small perturbations may amplify to the point where the system cannot return to its original state, and it grows into a new one (McClure, 2004:45).

2.6.1.9 Complex systems have a history

We can say that organisations are the sum of what came before. Richardson (2005:622) uses the concept 'system level memory' to explain that a system at any given point in time includes remnants of its past. Hence, to have a sophisticated understanding of the

current state of a system, you also need to have insight into its past. Important to remember is that a complex system's memory is not located at a specific place, but is distributed throughout the system - "*a collection of traces distributed over the system ... always open to multiple interpretations*" (Cilliers, 2000:24 & 122).

Johnson (2007:14) points out that agents' behaviour is affected by their memory, so that something that happened in the past may influence behaviour in the present.

2.6.1.10 Each element in the system is ignorant of the behaviour of the system as a whole

Individual elements can never comprehend a complex system fully, since they cannot contain the complexity of the whole system. Rescher (1998:45) draws our attention to the reality that complex systems encompass "*inexhaustible detail*", that they are "*ever unfolding*", and that they have "*more properties than they overtly manifest*." He reasons that it is beyond the human intellect's ability to come to cognitive terms with complex systems - that "*none can say all there is to be said*" about a complex system.

2.6.2 A special case: complex adaptive systems

Firestone and McElroy (2002:30), among others, point out that human social systems are special instances of complex systems, namely complex adaptive systems. Complex adaptive systems have the capacity to learn from experience and to adapt (Wikipedia). Two distinctive and linked properties of complex adaptive systems are emergence and self-organisation. Dressler (2007:19) defines self-organisation as "*a process in which structure and functionality (pattern) at the higher level of a system emerge solely from numerous interactions among the lower-level components of a system without any external or centralised control."* Thus self-organisation is the process that leads to the emergence of new patterns and/or properties. Following this definition, an organisational culture conducive (or not conducive) to information and knowledge sharing may emerge from the daily interactions of employees.

2.7 IKM and complex systems

'Complexity' became a key theme within IKM with the publication of David Snowden's Cynefin framework.

Figure 8: The Cynefin framework

Within IKM the Cynefin framework is used to explore the implications of 'managing' information and knowledge in different contexts or *domains*. Snowden argues that not all IKM interventions are appropriate in all organisational domains. The four domains he depicts are the known domain, the knowable domain, the complex domain, and the chaotic domain. These domains may co-exist within the same organisation.

In the known domain cause and effect relationships are predictable and repeatable. In terms of interventions this allows for legitimate best practice e.g. standard operating procedures. The appropriate approach to management in the known domain is to sense, categorise, and respond. An example would be an IT department sensing an organisational firewall failure, categorising the specific breach by means of the firewall failure plan checklist, and then choosing an appropriate response from a list of techniques for troubleshooting firewall failures.

In the knowable domain cause and effect relationships are separated over time. Suitable interventions are analytical/reductionist e.g. scenario planning. The appropriate approach to management in the knowable domain is to sense, analyse, and respond. An example would be the process that led to the creation of the firewall failure plan checklist in the example discussed above. The imaginary IT department sensed the risk of an organisational firewall failure, analysed the nature and extent of possible threats, and responded by producing a list of techniques for troubleshooting firewall failures.

In the complex domain cause and effect relationships are coherent only in retrospect and they most likely do not repeat. Suitable interventions entail pattern management. The appropriate way to operate in a complex domain is to probe, sense, and respond. An example here could be a firewall breach by a hacker via an unanticipated technique. The IT team would probe various ways of restoring the breach, find a solution via trial and error, and respond by restoring the breach. In retrospect they will be able to see how the hacker got past their defences, but the next hacker who comes along will most likely attack via a different route.

In the chaotic domain there is no coherent cause and effect relationship. Novel practices are necessary via an act, sense and respond approach. An example would be the whole IT infrastructure dying at random. The IT team may try various actions to bring the system back up, sense if one is working, and implement it. However, even in retrospect no one will know why the infrastructure died at random.

Snowden (2002:7) draws attention to the fact that human systems such as organisations are in essence complex, and that using complex adaptive systems theory to make sense of such systems is a sound approach. What's more, it makes sense to use complex systems principles to manage in a complex space. As mentioned earlier he refers to this approach as "*complexity-informed third generation*" knowledge management. In practice this entails interventions drawing largely on pattern management, for example stabilising desired patterns that are emerging, disrupting undesirable patterns that are forming, and seeding patterns that seem advantageous.

2.8 Conclusion

This chapter reviewed the existing literature pertaining to the topic explored in this study. Attention was drawn to the actuality that the concept 'knowledge management' is deemed a misnomer, since 'knowledge management' does not entail 'management' in the established sense of the word, but rather the fostering of organisational ecologies that are conducive to information and knowledge creation and sharing. Next the 'generations' of knowledge management were outlined: first generation knowledge

management that for all intents and purposes paralleled information management; second generation knowledge management in which the tacit dimension of knowledge and the sharing thereof was problematised; and the third and current generation knowledge management in which knowledge management is viewed through a complex adaptive systems lens.

Existing literature on information and knowledge sharing was discussed, followed by a discussion and listing of barriers to information and knowledge sharing. It was noted that while several authors categorised barriers, none went so far as to discuss the implications of viewing barriers as interacting meshes. In the next section the concept 'wicked problems' was introduced to make sense of the notion of interacting meshes of barriers. To conclude the chapter, the characteristics of complex systems and the literature on knowledge management within the context of complex systems were examined.

Chapter 3
Method

3.1 Introduction

The present chapter considers the sample included in the study, the methods employed, the reasons for choosing the methods used in the study, the limitations of the methods used, and how the qualitative data were analyzed.

3.2 The sample

In this study a convenience sample was used. Boone and Kurtz (2005:267) define a convenience sample as "*a nonprobability sample selected from among readily available respondents."* The *readily available respondents* in this instance were fifteen colleagues at a large professional services firm. Each of the lines of service, a range of staff grades (from associate manager to partner), and four territories were represented. The majority of respondents were not employed in an IKM role. The author was, at the time of the study, employed within the Global business group. This provided the author with a useful cross-territory view of the firm, as well as opportunities to interact with colleagues in an array of countries. At an organisational level the choice of the firm was deliberate in addition to being convenient, as the firm is one of a select group comprising the Global Most Admired Knowledge Enterprises (MAKE) Hall of Fame. Teleos Most Admired Knowledge Enterprises are seen as leaders in terms of:

- Creating an enterprise knowledge-driven culture;
- Developing knowledge workers through senior management leadership;
- Developing and delivering knowledge-based products/solutions;
- Maximizing enterprise intellectual capital;
- Creating an environment for collaborative knowledge sharing;
- Creating a learning organization;
- Delivering value based on customer knowledge; and

- Transforming enterprise knowledge into shareholder/stakeholder value.
  (Teleos, 2007:2)

The reasoning behind choosing a MAKE award winning firm was that barriers to information and knowledge sharing identified within such a firm may feasibly be classified as 'persistent'. These are barriers that persist even when sufficient management support, financial resources, human resources, infrastructure, IKM expertise and the like are available in support of IKM within the organisation.

3.3 The methods

3.3.1 Participant observation

According to Gray et al. (2007:180) participant observation may be used when the researcher is trying to "*gain an understanding of human action and social process by entering ... the worlds of those whose behaviours [he or she] is trying to understand.*" In this study the researcher tried to understand what is preventing individuals from engaging in organisational information and knowledge sharing processes. The author had some tentative suppositions as to the reasons for and nature of persistent barriers to information and knowledge sharing, which were tested by systematically observing events within the chosen setting.

During the observation process detailed note keeping and ongoing analysis proceeded concurrently. Direct quotations relevant to the topic were noted and considered for use as *in vivo*[2] codes. Observations are continuously woven into the tentative explanation.

3.3.2 Intensive interviewing

Gray et al. (2007:182) point out that direct observation may be complemented by a range of additional methods, including intensive interviews and documentary analysis. An intensive interview resembles an 'orchestrated' (from the interviewer's point of view) social conversation in which questions are often formulated on the fly, guided by the interviewee's trail of thought. As opposed to structured interviews, intensive

[2] In vivo codes are terms taken verbatim from respondents' statements

interviews do not restrict the interviewer to using only a questionnaire with specifically defined questions, but rather focuses on eliciting interviewees' *stories* about a number of discussion areas. These discussion areas are articulated in the intensive interviewing equivalent of a questionnaire, called an interview guide, that Gray et al. (2007:163) define as "*[a list of] specific issues to be brought to an interviewee's attention.*" They further list items that may be included in an interview guide, such as a range of topics to be discussed, plus contingency questions[3].

In order to be able to focus fully on conversing with the interviewees, the interviewer made use of an audio recorder for the intensive interviews. Following Gray's advice (Gray et al., 2007:182) a number of conversational techniques were used to get the most out of the interviews. These include:

- Expressing ignorance to elicit information;
- Repetition or restatement;
- Encouraging expanded responses, i.e. probing for additional related information;
- Summarising to ensure the interviewer and interviewee are on the same wavelength.

3.4 The reasons for choosing these methods

3.4.1 Participant observation

Jorgensen (1989:12) notes that participant observation is particularly well-suited "*for studying processes [and] relationships among people and events.*" The method's aptness to the exploration of persistent barriers to information and knowledge sharing becomes clear when one, following Stacey (2001:6), views information and knowledge sharing as a process, and more specifically, a *process of relating*:

"Knowledge creation is then understood as an active process of communication between humans. It follows that knowledge is not stored, but perpetually constructed. Knowledge is not shared as mental contents but perpetually arises in action. Knowledge is not transmitted from one mind to another but is the process of relating."

[3] The interview guide for this study can be found in Addendum 1

In order to understand what hampers the social processes of information and knowledge sharing, it is desirable to enter the social context in which this takes place. Grey (2006) agrees that the only way of discovering gaps in organisational knowledge flows is through *"ethnographic digging, an understanding of the organization, a deep appreciation of knowledge practices and emergent affordances."* Through observing and experiencing the barriers to information and knowledge flows that exist within the organisation firsthand, and engaging with others in the same context, a rich understanding of the issues develop.

3.4.2 Intensive interviewing

According to Gray et al. (2007:153) the quality of the rapport between the interviewer and interviewee is a deciding factor in determining the success of an intensive interview. Since a collegial relationship exists between the interviewer and the majority of interviewees in this study, good rapport already existed at the time of interviewing.

Also, interviewees expect the interviewer to have done his or her homework and be informed about the topic under conversation. Gray et al. (2007:153) note that "*the ability of the intensive interviewer to ... converse knowledgeable about the study and its purposes usually are highly persuasive aids in obtaining cooperation.*" Here again, as the interviewer in this study is intimately familiar with the context under discussion, it allowed her to draw on organisational shared meanings to grasp the issues under discussion, and make quick judgements on when to home in on a point made. A concept such as '*the Firm experience*' connotes specific semantics that the interviewer comprehends without having to ask for a lengthy explanation.

In addition to being fitting to the research sample, intensive interviewing is also well suited to the topic of the research. As mentioned earlier intensive interviews do not restrict the interviewer to using a questionnaire with only specifically defined questions, but rather focuses on eliciting interviewees' *stories* about a number of discussion areas. Tsoukas (2005:245-248) argues that storytelling, or the narrative approach, make for a more open-ended and systemic mode of enquiry, which is better suited to gaining insights into organisational complexity issues. For one thing, in storytelling the narrator places characters, events, and relationships in *context*. Through storytelling the

interviewee can sketch a detailed picture of the specific context in which s/he experienced barriers to information and knowledge sharing, or in Tsoukas' phrasing, "*provide sensitivity to the situational particularity.*"

3.5 The challenges of using these methods

3.5.1 Participant observation

McBurney and White (2004:221) note that problems of objectivity come with the territory when doing participant observation. They highlight the risk the observer faces of taking the research subjects' point of view to the detriment of scientific objectivity. Conversely, a number of authors, including Gray et al. (2007:xx), stress that the postmodern school have problematised concepts such as 'objectivity'. They advise that researchers "*should personally participate in the activities and social worlds of their subjects while maintaining some degree of objectivity and detachment in their role and analysis"* (180).

This tall order necessitates what Tsoukas (2005:248) terms 'second order thinking'. Specifically talking about researchers investigating complex systems, he cautions that *"appreciating complexity requires a second order thinking about complexity. That is, not only must we engage with the system under study, we must also confront our own complexity. In narrative terms, complexity theorists are part of the stories they tell about complex systems.*" In the context of this study it necessitated constant reflection on the part of the researcher; being aware of *a-priori* assumptions and intuitively using a complexity lens when observing situations.

3.5.2 Intensive interviewing

Gray et al. (2007:173) note that the most significant limitations of intensive interviewing are generalizability and reliability: The sample used is generally too small to allow for generalisation, the interview process by and large eludes standardisation, over-rapport and interviewer bias are vulnerabilities, and standardisation is data analysis procedures is lacking.

Gray et al. (2007:171) point out that it is possible for skilled, reflective interviewers to minimise the limitations mentioned, as is the case with participant observation.

3.6 How the data was analysed

To determine whether persistent barriers correspond to the characteristics of complex systems, codes were formulated that account for the characteristics of complex systems as identified by Cilliers. These "*preconceived, logically deduced codes into which data are placed*" (Charmaz in Grey et al (2007:197) are better suited to quantitative analysis, and were therefore not used to categorise data. Having been 'theoretically tainted' by a complex systems viewpoint, the danger was that data would inadvertently be 'forced' into preconceived categories. Charmaz (2006:23) warns against having codes that emanate from an earlier frame applied to the data, rather than having codes arise from a careful reading of the data. It was preferable therefore to have the codes stick as closely to the data as possible, i.e. emerge from the data.

Rather, following Gray et al. (2007:195), analysis began by identifying descriptive categories within the data collected, i.e. coding the data. Charmaz (2006:43) defines 'coding' as "*categorizing segments of data with a short name that simultaneously summarizes and accounts for each piece of data.*" Each segment was carefully mulled over and a descriptive category or categories were noted next to each. To stay as close to the data as possible *in vivo* codes were used where feasible. Once the 'open coding' (Strauss and Corbin, 1998:119) process was completed, some codes were clustered into broader categories, while some were unpacked into subcategories. Core categories, i.e. the most central and rich categories that emerged as the main concerns of, or problems for, the participants (Shekedi, 2005:122), were identified. A number of criteria, suggested by Strauss (1987:36), were used to distinguish core categories, for example:

- Core categories must be central, i.e. related to many other categories;
- Core categories must appear frequently in the data;
- Core categories relate easily to other categories;
- Core categories in a substantive study have clear implications for a more general theory.

Finally, the categories that emerged from the data were compared to the preconceived categories which were formulated to correspond to the characteristics of complex systems found in the literature. Shekedi (2005:135) refers to this process whereby the researcher compares the 'fresh' set of categories which s/he has developed with concepts found in the literature as theoretical category construction.

Chapter 4
The participants speak

4.1 Introduction

In this chapter the data collected through intensive interviews are presented, followed by a discussion of the study results vis-à-vis the ten characteristics of complex systems as detailed by Cilliers (1998:2-5). We will explore the extent to which the characteristics of complex systems are associated with persistent barriers to information and knowledge sharing by examining whether the categories that emerged from the data mirror the characteristics of complex systems.

4.2 Core categories emerging from the data

From a methodical analysis of interview transcriptions, field notes, and internal firm content, a number of core categories emerged. To remain as true to the data as possible *in vivo* codes were used to label categories where reasonable.

4.2.1 "*101 Things*"

When asked what hinders fluent information and knowledge flows within the firm, the majority of interviewees opined that there are too many 'things' complicating the sharing process. These include:

4.2.1.1 Systems, primarily information technology systems

> *"I have a number of places that I can go to for information and news. The problem is that we have so many places and types of places that there is no useful way of maintaining a watch on the whole lot. The problem is when I want to watch for updates on the UK Wiki, news channel etc. There is no useful way of aggregating all of this content into one place."*
>
> *"Now that's one thing we have - thousands of databases."*
>
> *"We have more and more databases."*

"I am concerned that our users will be confused by the numerous tools they can use and not really understand when to use the most relevant one."

"We have all the modern technologies you can think of."

"So far it's [referring to collaborative software suite] *mainly one more thing I'm supposed to track; it's not reducing my effort to collaborate much."*

"As a user suffering like most everyone else from information overload, I'm not particularly keen to navigate a growing set of balkanized systems. I already have more than twenty login IDs and passwords for accessing and exchanging content.

"I really want to talk to people; I don't want to talk to databases - databases don't talk back."

4.2.1.2 People and communities

"It is time consuming and growing complex to keep up with blogs and communities within the pilot."

"For you to try [to identify those colleagues who will find a particular piece of content useful] - logistically - there are 500 people in this building."

"We're probably around a thousand people in our region."

"There are so many communities and so many different issues that it is very difficult to find what I am interested about."

4.2.1.3 Knowledge areas

"My field is very fragmented; there are so many aspects, you almost have a specialist in each."

"There are just so many things to stay abreast of."

"There has been a knowledge explosion around auditing."

"People all have their own bits of expertise - it's specialist knowledge - not the stuff you learn at university"

4.2.1.4 Communicative interactions

"We come from an email culture where everything has to be 'acknowledged' or dealt with - even if it is deleting it out of an inbox."

"Of the 50-100 emails you get in a day only 10 are probably relevant to you, but you go through them all and it takes an awful lot of time."

"There is so much information coming your way ... in terms of email that you get copied in on."

"I'm in a number of different teams in different areas so I'll get mails from many different people. I get mails from you guys on taxonomy, or I'll get mails from M_____ on things happening in architecture..."

"There is a lot of knowledge that is pushed at people that is not really job specific."

"They say give me the basics - I just need the basics. A lot of content is thrown at them that they don't really need. They get all of this other stuff. People don't want to read through a big fat book. If I have a problem I'll call the helpdesk."

"If you read everything that comes your way you'll be reading all day every day. You won't be able to do any other work."

4.2.1.5 Locations

"There's still a big disconnect between Johannesburg and Cape Town - everybody is working in their own territories."

"Sometimes a discussion starts around a specific subject - say in Johannesburg - but they don't always think to include us."

"Where the people are can sometimes be difficult - Johannesburg, George, Paarl, Stellenbosch..."

"It's really a problem if the guys are in Johannesburg and you just don't get a response."

"The financial manager sits in Singapore, the IT manager sits in Africa, the box sits in America, and the stuff is produced in Australia."

4.2.1.6 Tasks

"It depends if you have 120 other things to do."

"There are so many other things to worry about - whether your files are correct ..."

Admin - there's a lot of it!

"If you throw up three or four things at the same time, and people need to prioritise - it's a lot of pressure."

"There is a risk that we get bogged down with too much admin and we lose sight of what our day job is really."

"In our business a load of new regulatory things appeared ... there is just more to do."

"It comes down to how many other things people have to do."

*"People are too busy to participate. They have other work to do. I was talking to someone in our new manager training. He said I have to leave at noon. I said the training is going on until 5. He said but I *have* to be at a client. My boss doesn't even want me to finish this training. He wants me at a client right away starting work. And I thought "wow!", when you think about it in those terms, when is this guy going to find time to participate in the wiki for example. These people are very busy because they are billable. You think, oh, they can just do it for an hour a day..."*

Observation of the Global Controlled Vocabularies Service substantiates the narrative evidence. The following listing of *some* of the elements involved in the Service makes it clear that this subsystem is 'structurally intricate', to use Moldoveanu's term (in Clegg et al., 2006:170).

Table 2: Some of the elements involved in the Global Controlled Vocabularies Service

Elements	Instances

Elements	Instances
Systems, primarily information technology	Synaptica (CV management tool) Consuming applications e.g. Documentum, Lotus Notes CV Publishing Site Global CV Service wiki Social software application Collaborative software applications Global and territory portals Etc.
People and communities	Synaptica User Group Global Vocabulary Governance Group Territory Governance Groups Global Vocabulary Custodians Territory Vocabulary Custodians Vocabulary Communities of Contributors Network Technology Group Global Knowledge Management Repository project team Etc.
Knowledge areas	Knowledge management Content management Enterprise information architecture Search Social software Web information architecture Project management Etc.
Interactions	Technical Team meetings Vocabulary Governance Group meetings Project Team meetings Standards Updates KM Newsletters Wiki Updates Controlled Vocabularies discussion forum Synaptica blog Etc.

Elements	Instances
Locations	UK (Service customer) US (Service customer) Canada (Service customer) Germany (Service customer) Netherlands (Taxonomy group) Etc.
Tasks	Controlled vocabulary development Controlled vocabulary maintenance (including revision) Service marketing Controlled vocabulary governance Stakeholder communication Stakeholder training Content auditing Etc.

The above makes clear that even a single subsystem, i.e. the Global Controlled Vocabularies Service, is both socially and technically complex. Conklin (2006:3) defines social complexity as "*the number and diversity of players who are involved in a project. The more parties involved in a collaboration, the more socially complex. The more different those parties are, the more diverse, the more socially complex."* Not only is the Service evidently socially complex, it is also technically complex. Conklin (2006:16) explains technical complexity as "*the number of technologies that are involved in a project, the number of possible interactions among them, and the rate of technical change*."

Within a network of firms where information and knowledge sharing is defined as "*getting the right content to the right person at the right time*", *101 things* make it easier said than done for employees to identify what the right content is, who needs it, and how to get it to them.

4.2.2 "*Not getting anything out*"

A number of respondents mentioned that individuals do not see any benefit in sharing information and knowledge, or learning from others, if they are not rewarded in some way for sharing:

> *"I don't know if people get enough recognition for the fact* [that they share information and knowledge] - *so why would you worry."*
>
> *"I don't know if people get the necessary recognition."*
>
> *"There is no incentive for me to do it* [contribute content to a repository]. *It only takes from me - I don't get anything out."*
>
> *"Knowledge management has spent too long mucking about trying to capture the 'how'. You can't. It's too difficult. It's locked in people's heads. People don't have time to share it and quite frankly they're not motivated to share it."*
>
> *"Where you're talking about continuous development, where the firm or the manager has an obligation to teach somebody something, it's a different scenario to one where somebody actually wants to participate, where they want to attend a lunch and learn session for example because they *want* to learn a new skill. You're more likely to find they will have time available if there is a benefit to them."*

4.2.3 "*Change all the time*" / "*A very different environment*"

A constantly changing external environment which calls for corresponding changes within the organisation was repeatedly mentioned as a barrier to fluent information and knowledge sharing:

> *"There has been a knowledge explosion around auditing; the environment has changed a lot."*
>
> *"Our information... by the time it reaches the repositories... no one is interested in it anymore. It's the sad reality and it's why we manage our stuff outside their* [the knowledge managers'] *processes - our processes' footwork is faster."*

"It's the technology and the environment that changes. The art is knowing what's coming."

"It becomes more difficult. Every year there are more principles; they change all the time. After Enron and Parmalat... there are more and more rules."

"The challenge is that you have information that changes all the time. Something that is the case now may not be the case in six months time."

"The challenge is to stay up to date with developments."

"The moment you have something that is not updated regularly you're in trouble."

"There are continuously additions and changes."

"Colleagues who completed their studies long ago... the challenge is to keep them up to date with new developments; it's a very different environment."

"This knowledge - the stuff [good practice] *you can use on a daily basis where innovation is not the goal - lasts at least a year."*

Because information and knowledge is context- and time specific, changes in the environment necessitates changes in information objects such as good practice guidance, thought leadership pieces or staff competency profiles. It further necessitates changes in employees' knowledge i.e. their mental models and habits of thinking, and changes in the firm's distributed knowledge base i.e. organisational routines and shared understandings. Tsoukas (2005:265) points out that - if researchers who study high-velocity environments are to be believed - competitor, legislative and technological changes in the business environment "*are faster and more frequent than ever in the history of capitalism*." Employees who are already pressed for time find it difficult to continuously internalise the information required to perform optimally in an ever changing environment. They also find it challenging to keep the information they are responsible for maintaining up to date.

From an information and knowledge sharing perspective the impact of external change on the subsystem used as an example in this study - the Global Controlled Vocabularies Service - is evident. With Web syndication gaining popularity, for example, demand

grew for the Service to share information in other formats, such as Web feeds, in addition to the established formats such as email newsletters. Furthermore, with developments around the semantic Web, Service team members had to grow their expertise and shared understanding in new knowledge areas, for example developing a rudimentary understanding of formal specifications such as the Resource Description Framework and notations such as the Web Ontology Language. Also, with increased usage of social software applications such as social bookmarking tools within the firm, the Service team had to grow their understanding in the area of new tagging tools such as folksonomies, and update all Service-related knowledge objects to incorporate the new focus area.

The global financial downturn of 2007-2009 prompted member firms to cut travel spending substantially - in some instances introducing a complete travel freeze. While the extended Vocabularies Service team could occasionally meet face-to-face for training, strategising, and the like, they were now oblige to seek alternative means of interaction such as videoconferencing.

4.2.4 "*When knowledge leaves*"/"*The original thoughts*"

A number of interviewees cited high staff turnover as an impediment to information and knowledge sharing. When an employee leaves the firm more often than not loses access to his or her knowledge. This is compounded by the fact that employees commonly leave the firm without serving their two months notice period:

> *"There are significant skills which are vested in specific people in the firm, and that knowledge... when that knowledge leaves it leaves a big hole."*
>
> *"Turnover in the advisory practice is very high, which means every three years we basically have to train everybody from scratch."*
>
> *"In the last three months we lost three of our strongest people. We have one person left with deep technical knowledge. If he walks we're in trouble."*
>
> *"Most people do articles, stay a year or two, and then they leave."*
>
> *"We have continuous new people - people moving out."*
>
> *"We have a high turnover of people - it's the nature of the job."*

"You won't convince him to stay because he wants to go to New York when he's completed his clerkship."

"H_____ [an employee who retired and was asked to continue working for the firm "because he has experience of what can go wrong"] *may *never* leave the firm."* [Said only half-jokingly]

"Employees have a two months notice period but they're seldom held to it; usually they leave within a month."

"The key issue for the firm is not to let senior people leave."

The experience of the Global Controlled Vocabularies Service mirrors the experience of the business groups above. In a short span of time the Service Sponsor and the Service Manager/Service Architect resigned, plus the Service's Technical Consultant and three territory taxonomy managers. In the majority of instances the full notice period was not served. The external development team who built the vocabularies publishing site moved on to other projects upon delivery of the site, and from there on mostly did not respond to requests for information from the Service team.

The reality of employees continually joining and leaving the network of firms ties in with the closely related category - "the original thoughts". A number of respondents remarked that they lack key understanding pertaining to a specific process or information system. Because they do not understand the significance of a specific element, they themselves find it challenging to engage with colleagues around the topic. In all of the instances quoted below "*the person who had the knowledge in the first place*" had left the employment of the firm.

"It was very difficult for me to figure out why certain things were done in certain ways."

"Well I inherited it as well, it was created off the back of something I did not fully understand at the time and so I put that to one side, thinking I'll work with it like that - no real questioning it. But now the situation has arisen where we do need to understand the validity of it. But without the documentation to support why the decision was made it's quite challenging,

and the solution - I think - is for us to go back to the person who had the knowledge in the first place, and question them some more."

"You don't really know what the original thoughts behind it were when they created it. You only see what the user is interacting with now."

4.2.5 "*Some people*"

A number of respondents noted that certain colleagues were instinctively disinclined to share what they know or to reach out to others for information or expertise. There was also a perception that some individuals are naturally talented at sharing their knowledge, while others lack this innate talent:

"There are some people - specialists - who keep to themselves and do not share easily with others."

"Some people communicate with ease; others keep to themselves and are less accessible."

Some people get the idea of the importance of sharing their knowledge in a knowledge-intensive business while some do not.

"Some people are very shy."

"Some people just want to know more, want to stay up to date. For example some people read the newspaper daily and some don't."

"There are some people for whom coaching come naturally. However, if you're not like that..."

"People don't want to look stupid. It takes a special kind of person to keep asking questions."

4.2.6 "*Missing something*"

The majority of respondents mentioned that they often feel as if they're "*missing something*", either because they struggle to find the 'best' sources of information, or because they're not sure who could fruitfully use the insights they themselves are generating:

"Identifying who the best people are to talk to ... identifying who needs the information ... that is sometimes difficult."

The problem with email is that you have to know who now, or in future, might be interested in the questions/info/idea in your email. And you just don't know who that might be outside of your immediate circle of contacts."

"You're never quite sure if you're touching everyone you're supposed to touch."

"I am struggling to keep up with the requests/blogs that appear on the system. I could easily miss something that is very useful or interesting to me unless I log on very regularly (which is difficult when you are busy)."

"Not knowing what people's interests are, not having an understanding of which client and what issues pertain to them, and not having a mechanism to track that knowledge."

"The problem I have is that too few people know what I do."

"I will send mails to people on things I think are interesting based on what I think they're interested in, so you think 'who do I know who might be interested' and you send it to them, but you can't ensure that you don't miss people."

"There is an issue... who else should we speak to to be certain we did not miss anything."

"I received lots of alerts but I didn't know who would be interested in it. Only after three of four years - now if I see something I know ok Marketing would like that or TICE would like that."

"You assume everybody is doing it the same way and you don't realise others can benefit ... you don't think anybody else will think it's unique or valuable."

From the point of view of the Global Controlled Vocabularies Service it was found time and again that business groups that could benefit from controlled vocabularies were not aware of their existence. Also, in some instances it took the Service team months to become aware of colleagues exploring closely related subjects such as ontologies. In a number of cases, taxonomists in one territory were struggling with issues that colleagues in another territory had already solved, or were developing vocabularies that have already been developed by a member firm.

4.2.7 "*That kind of relationship*"

A number of employees noted that they are more likely to respond to requests for information or expertise if they know the individual posing the request, either personally or through a mutual colleague. Similarly, they felt that their requests were more likely to be heeded if there was an existing, positive relationship with the source of information or expertise:

> *"I send a one-liner to my Partner and he phones me and we talk about it. If you don't have that kind of relationship, it's going to be very difficult to get the information. If you don't have that kind of relationship they're not going to read your email or they're not going to take your call."*
>
> *"One of the most important things is your network - the fact that you have relationships with people"*
>
> *"I may not respond quickly to an email request from someone I do not know, but will if there is some personal connection - 'S_____ said you might know the answer to this question...'"*
>
> *"Despite the best technology enabled environment, nothing beats knowing people and maintaining contacts in your network."*
>
> *"That one-to-one network is what keeps things going. I know who does what so I rather phone that person directly."*
>
> "We all know one another; what we do is we talk to one another on a monthly basis."
>
> "You have to work at building a network."
>
> "Once you get to know people, you ask and you're fine."
>
> *"When I've got a technical accounting question my first thing is not going to be ok let's go find a book and read it. I'll just go down to F_____, because I know they're the technical people and I'll ask them the question."*
>
> *"It's also how you approach people. If they don't like you they're just going to say 'no'."*
>
> *"The more trust you build the better the information sharing."*

4.2.8 "*Take the message further*"

A number of respondents mentioned that frequently it is not obvious who holds the information or expertise an individual has need of. An employee will have to dispatch a message though his or her network, trusting that it will reach the appropriate colleague or colleagues:

> *"What you usually do is send someone a mail and say J_____ advised that I speak to you. He'll then either send you the information or say 'you should speak to S_____'."*
>
> "It's for example like when you join, you won't be told about this, that, and the other, sometimes you've actually got to find it out on your own, and that's where the whole thing of asking the person next to you becomes important."
>
> "That's what I said earlier about the email: you don't expect to hit everyone when you forward the email, but then you expect them to forward it again. And you'll see that - sometimes when you get an email that's been to five or six people before it got to you as the right person, because somebody said I'm looking for some help with this vocabulary to their IT guy, and he sent it to somebody else who sent it to G_____ and then it finally comes down to you. That's how people connect at the moment, because there is no easy way ... I don't think ... and people try people rather than systems."
>
> "You can't connect at the ground level with everybody - you have to aim higher than that and rely on others communicating the message for you. So do a good sell with a specific group of people and expect them to take the message further."
>
> "The more ties you have with people the easier it is to identify [who needs the information or knowledge]"
>
> "If you don't get to the right person in ten minutes you're probably not asking the right people. Ask the person next to you, or ask your partner, because they will know who to ask. Usually your peers first, and then you work your way up the rung."

4.2.9 Clustering together ("*Saamkoek*")

Several respondents commented that employees tend to share what they know mainly within their existing group:

> *"In practice it's the guys you work with closely who most often come and talk to you. It's about the rapport you've built."*
>
> *"We work in three silos - to talk across the silos is a huge problem."*
>
> *"The guys from tax together, the guys from auditing together - it's just natural."*
>
> *"The divisions work as autonomous units: advisory will have their own tools and whatever, and so will audit. Even within audit you have TICE, you have CIPS... Each of those divisions will have their own meetings. It's only once a year that you have like one meeting."*
>
> *"You consciously have to make a point of mingling with and talking to people; it's more effort than to talk to people you already know."*
>
> *"[At socials] you tend to go to the table you know; you tend not to mix with others - a lot of times it depends on what type of person you are."*
>
> *"We keep [the training materials] in a close group of people who know how to use it."*

It was observed that even employees with a shared area of responsibility and interest, in this case controlled vocabularies, irregularly shared insights and content outside their core group, unless regular meetings to the effect were scheduled. It should be noted that an interesting development came with the introduction of social software with wiki- and communities functionality to a pilot group within the firm. While individuals used wikis and online community spaces to share and discuss content primarily with their core group, the open access (*within* the network of firms) nature of these spaces gave any employee the opportunity to gain insight into the communications of assorted groups. As one employee noted:

> *"The beauty is that those messages are now broadly and easily available to others - who you didn't even know were interested."*

Often individuals who came across groups and individuals with associated interests initiated contact. As one employee mentioned:

"If someone is posting content that I enjoy reading I will more than likely reach out to them and make a connection."

In the pilot group it appeared that unsolicited contact from a colleague with shared interests was typically welcomed:

"Although Plink is far from perfect, I've made numerous connections through the pilot thus far that I otherwise would not have. It's exposed me to people working on similar issues and willing to share knowledge that I may not of otherwise met. Often those have been unsolicited - which is the value. I wasn't particularly looking for them but I met them anyway and received value from this."

4.3 Discussion: how the core categories correspond to the characteristics of complex systems

Each of the core persistent barriers that emerged from the stories and anecdotes told by employees correspond to one or more attributes of complex systems:

Table 3: The characteristics of complex systems with corresponding core categories

Core categories	Characteristics of complex systems
"*101 Things*"	Complex systems consist of a large number of elements or components
"*Not getting anything out*"	Complex systems consist of a large number of elements or components
"*Change all the time*"/"*A very different environment*"	The large number of elements interact dynamically They are usually open systems
"*When knowledge leaves*"/"*The original thoughts*"	They are usually open systems Complex systems have a history
"*Some people*"	Complex systems consist of a large number of elements or components

Core categories	Characteristics of complex systems
"*Missing something*"	Each element in the system is ignorant of the behaviour of the system as a whole; it responds only to information that is available to it locally
"*That kind of relationship*"	Complex systems consist of a large number of elements or components
"*Take the message further*"	The dynamic interaction between the elements is rich
Clustering together ("*Saamkoek*")"	The interactions usually have a fairly short range

Also characteristics not associated with core categories were observed to have an impact on information and knowledge sharing, as will be considered below.

4.3.1 Complex systems consist of a large number of elements | "*101 Things*", "*That kind of relationship*", "*Not getting anything out*", and "*Some people*"

4.3.1.1 "*101 Things*"

The large number of elements -"*101 things*" - that constitute the firm and shape the work life of employees surfaced repeatedly as a perceived hindrance to information and knowledge flows. Employees lamented the many tasks that needed to be performed, the wide selection of channels through which to communicate and the numerous repositories in which information is stored, the deluge of (frequently irrelevant) content coming their way, the large number of colleagues and communities in numerous territories, and the growing bodies of knowledge they have to deal with. The finding that too many 'things' complicate the sharing process finds resonance in the existing IKM literature.

When it comes to information and knowledge sharing, time is an essential resource. Based on their involvement in more than one hundred knowledge projects over five years, Fahey and Prusak (1998:268) is of the opinion that "*knowledge is a direct outcome of experiences, reflection, and dialogue - three activities that use up that most precious managerial asset: namely, time.*" Husted & Michailova (2002:65) concur that

sharing is a time-consuming activity. An intervention such as mentoring, for example, may be an effective way to facilitate the sharing of 'deep smarts', but it is also a time-consuming endeavour. The same goes for activities such as after action reviews, peer assists, and storytelling. On the surface, it sounds reasonable that employees who are already overloaded by the minutiae of daily tasks view knowledge sharing as an additional burden.

It becomes even more complicated when we consider Rittel and Webber's (1973:165) admonition that "*every wicked problem can be considered to be a symptom of another problem.*" Thus a lack of time for knowledge sharing can be considered a symptom of the failure to embed processes and activities aimed at supporting information and knowledge sharing into individuals' daily work activities. It is when organisations fail to identify interventions and tools that integrate sharing seamlessly with operational tasks that these activities are seen as bothersome add-ons, rather than a natural part of "the way we do things around here", and are consequently neglected or engaged in superficially. Because organisations have idiosyncratic work flows, Fontaine and Lesser (2002) warn against the appeal of a 'one-size-fits-all' IKM solution. They advocate spending "*a significant amount of time understanding how work gets done, the knowledge requirements of individuals who are actually doing the work and the business environments in which these employees operate*". It is only once it is understood how work gets done in an organisation that information and knowledge sharing actions can be cultivated that merges seamlessly into existing activities. An example of successfully embedding sharing activities would be the US Army's use of After Action Reviews.

Another category of 'things' mentioned that make demands on employees' time is information systems. As one employee said, "*There are too many databases and different places to locate information. It can take up too much time just to figure out which one to go to.*" Numerous complaints regarding the number of information systems individuals have to deal with point to the inability of organisations to create technology infrastructures that support sharing all but unobtrusively. One respondent summarised the issue well: "*Tools that we use daily need to be able to integrate … none*

of these tools interact with each other." Several authors focus on the trend of multiple, disparate systems characterised by a lack of shared standards as a barrier to information and knowledge sharing. Gartner researcher Toby Bell (2005:4), for example, estimates that the typical company has between five and twenty content management systems and repositories, which would explain the prevalence of organisational "content blindness." Employees who have to log into multiple systems separately to gain access to information will in all probability be disinclined to search systematically for information. The odds of employees routinely accessing "the right content at the right time" are low when the organisational body of knowledge is stored in multiple, unconnected repositories. In organisations where such an 'accidental architecture' exists, individuals are often not even aware of the existence of potentially useful information assets, which unwittingly leads to suboptimal information use. (Handler and Newman, 2005:3) And even when individuals in organisations with redundant information repositories *do* find content they deem useful, they may still be uncertain as to whether they've found the authoritative source - what Gartner terms the master data store or colloquially, the "single version of the truth." (Newman, 2005:3)

The above may sound like a "tame", solvable problem that can be resolved through IT simplification interventions, until we view it as symptomatic of a more general problem. Knox (1999:2) hints at more fundamental issues underpinning the problem, identifying the greatest barrier to implementing enterprise information systems as the silo mentality found in many organisations, which translates into technology silos:

"Individual units have pursued applications development in isolation, resulting in technology silos and stovepipes that match the organizational structure … The cultural divide among product and channel business units, marketing, finance, and IS, and the resultant poor communication and political rivalries, impede the development of a shared vision and standards for addressing integration of siloed processes and systems."

Knox follows the symptom, i.e. multiple, disparate systems, back to its source, i.e. the "cultural divide" that is common in organisations. Here too the dynamics of wicked problems can be seen at play. Rittel and Webber's (1973:165) warning - "*the higher the level of a problem's formulation, the broader and more general it becomes, and the more difficult it becomes to do something about it*" - rings particularly true in this

instance when one calls to mind that bringing about cultural change within an organisation is one of the thorniest interventions to succeed at.

Another category of elements participants drew attention to is communicative events. The oversupply of information, "*a state where the individual is no longer able effectively to process and make use of the amount of information to which he or she is exposed*" (TFPL) is also a hindrance to information and knowledge sharing mentioned frequently in the IKM literature. Kirsh (2000:20) lists the communicative events that inundate the knowledge worker, making for "*a workspace of increased complexity, saturated with multi-tasking, interruption, and profound information overload.*" These include email, telephone calls, electronic discussion groups, websites, pushed intranet news, letters and memos, faxes, stick-ems, calendars, pagers, and physical conversations and meetings. It's even more worrisome when we take into consideration that Kirsh created this list before the use of instant messaging, Internet telephony and social software became ubiquitous. This 'cognitive overload' leads to 'information anxiety', with detrimental consequences for the individual and organisation concerned. Kirsh lists some negative consequences of information anxiety such as tension with colleagues, loss of job satisfaction, and delay of important decisions.

The observation made by a number of participants, i.e. that the large number of colleagues and communities spread across numerous territories complicates information and knowledge sharing, finds resonance in a number of IKM studies. McDermott and O'Dell's (2001:82) assertion, that "*the 'coffee pot' just does not scale to a global level*", neatly underlines a challenge that confronts knowledge managers, namely that knowledge, since it is closely bound up with practice and difficult to elicit without losing much of its contextual richness, does not travel well. Edmondson and Detert (2006) note that an increase in organisational size, which typically links to increases in organisational and/or geographic dispersion, impacts negatively on the quality of intra-organisational communication:

"In smaller companies, where everyone knows and regularly interacts with top managers, there is less likelihood employees will be silent based on lack of established relationship or lack of accessibility. Then, throw in the physical distance between sites and culture differences that

multinational corporations have to deal with and, yes, creating a positive setting for voice can be a serious challenge."

Even when sophisticated communication and collaboration technologies are in place, other factors may impede fluent information flows in organisationally and/or geographically dispersed organisations. Adding an interesting perspective, Cabrera and Cabrera (2002:698) propose that individuals in large organisations routinely feel that their contributions will amount to such a small drop in the bucket that they might as well not contribute. Uncooperative employees may view this as an opportunity, reckoning that their lack of contributions have a better chance of going unnoticed, allowing for what Kollock (1998:24) calls "anonymous defection." This is not an unreasonable assumption, since tracking the quantity and quality of individual contributions in a large organisation can be problematic, especially since not all exchanges involve codified information. Also, in large organisations with poor attention to content management, individuals may choose not to contribute information because of low levels of 'connective efficacy', i.e. they do not believe that others will actually receive the information even if they contribute it (Cabrera and Cabrera, 2002:698).

Facilitating fluent information and knowledge flows in the midst of this cornucopia of activities, individuals, systems, locations and interactions is clearly a problem that deserves the designation 'wicked'.

4.3.1.2 "*That kind of relationship*", "*Not getting anything out*", and "*Some people*"

It was emphasised earlier that the elements constituting complex systems can be complex systems too, and pertinent to this study is the human 'element'. Cilliers (2002:80), for one, notes that "[the individual] *is a complex thing in itself, constituted through the web of relationships with others and the world.*" The oft quoted saying - 'managing people is like herding cats' - holds true when it comes to getting people to share information and knowledge. Three closely related core categories that emerged, i.e. "*That kind of relationship*", "*Not getting anything out*" and "*Some people*" concern the reality that people, as elements of complex social systems, are themselves complex entities.

"*That kind of relationship*"

As noted by several respondents individuals are more likely to share information and knowledge with colleagues with whom they have an established, trusting relationship. Conversely, a strained source-recipient relationship will more often than not act as a barrier to information and knowledge sharing (Simard and Rice (2003:14); Szulanski (2003:31). A study by Kolekofski and Heminger (2003:525), for example, showed that interpersonal feelings between an information holder and those with whom information could be usefully shared may determine his or her inclination to share what he or she knows:

"How the requester treated the information holder in the past, whether with kindness or with disdain, may determine whether the information holder is willing to share information."

Based on his observation of information behaviours at a professional services firm, Pollard (2005:2) explains the causal relationship between strained interpersonal relations and information flows as follows:

"Most people want their friends and even people they don't know, to succeed, and people they dislike to fail, and this has a bearing on their information-sharing behaviour: The more politics are at play in the office, the more likely the flow of information is likely to be impinged."

Here Dave Snowden's (2002:3) frequently quoted heuristic - "*knowledge can only be volunteered; it cannot be conscripted for the very simple reason that I can never truly know if someone is using his or her knowledge*" - comes into play. If it's impossible to determine the extent of an individual's knowledge, it's impossible to tell if s/he is sharing to the best of his/her ability. Therefore, if an individual dislikes a colleague, chances are that s/he will engage in 'camouflage behaviour', pretending to share but doing so only superficially whilst keeping his or her 'deep smarts' under wraps.

It was also noted that "*the more trust you build the better the information sharing.*" From the perspective of the information provider trust involves an expectation that the recipient of the information will not behave opportunistically if the opportunity to do so arises (Wang & Rubenstein-Montano, 2003:118). Within the context of communities of practice, Ardichvili, Page and Wentling (2003:72) found that 'opportunistic

[information] behaviour' entails a recipient using the information shared as the basis for a personal attack on the provider by challenging his or her professionalism, or employees using confidential information to advance their own agenda at the expense of their colleagues and the organisation as a whole. Marchand, Kettinger and Rollins (2002:121) have argued that employees are more likely to share information with, and use information provided by, colleagues whom they deem to have 'information integrity', i.e. colleagues who use information "*in a trustful and principled manner.*" Colleagues with information integrity are trusted not to manipulate information for personal gain, knowingly pass on inaccurate information, distribute information to justify decisions after the fact, or to hoard information. Evidently, individuals are unlikely to share information with colleagues whom they suspect will use the information unscrupulously. They are equally unlikely to rely on information made available by individuals who are known to have dubious 'information integrity'.

"*Not getting anything out*"

Florida (2004:28) points out that individuals' "*motivations are many and varied.*" While the ideal is for all employees to be intrinsically motivated to create and share knowledge for the greater good of the organisation, the reality is that most employees approach information and knowledge sharing with a 'what's in it for me' attitude. A number of respondents shared the opinion of a colleague who said: "*It only takes from me - I don't get anything out.*"

Davenport and Prusak (1998:31-33) identify three things that may motivate individuals to share their expertise, i.e. reciprocity, repute, and altruism. Reciprocity involves that an individual will share expertise with the expectation that s/he can count on in-kind behaviour at a later stage. Secondly, having a reputation as an expert can secure job security, promotions, and bonuses. Also, being a reputable knowledge sharer might make colleagues more inclined to reciprocate. Lastly, some individuals may be motivated to share expertise simply because they are passionate about their subject, and/or altruistic. One interesting comment suggested that some employees may be motivated by perceived risk *not* to share their opinions in public forums - such as social media - within the firm: "*Within the firm those with status and/or authority can read whatever you have said and act on it. Imagine going up for a promotion - and having*

the people who are selecting you being able to review every post, every comment, you have ever made. The downside risk is that something you said somewhere at some time strikes them the wrong way." In organisations that are not keen on challenging long-held assumptions and deeply ingrained routines, ideas that will challenge highly institutionalised practices may therefore be kept under wraps in a conscious choice not to 'rock the boat' (Disterer, 2001:3). This is quite worrying when one considers that Eisenhardt, Kahwajy and Bourgeois (1997:85) found a positive correlation between 'constructive disagreement' and better organisational decision making. Conversely, in organisations where the management teams' members were dissuaded from challenging one another's thinking, key issues that should have been considered, as well as a wide range of possible solutions, were routinely overlooked.

In addition to those authors who call attention to the fact that some individuals choose not to share what they know, a number of authors also write about individuals who lack motivation - for various reasons - to *acquire* knowledge and information. Dixon (2004:18) calls it a demand side problem or 'asking problem'. She notes that the dilemma of employees who are hesitant to ask for help because - in their view - "*asking for help denotes helplessness.*" Employees may also lack motivation to acquire knowledge and information because it's not expected of them to generate insights or improvements, but simply to 'work to rule' - i.e. "*do exactly what is specified and nothing more.*" (Rothbard, quoted in Knowledge@Wharton, 2006:5) Katz and Allen (1982:17) raise an interesting issue, arguing that some employees strive to maintain their own status quo within the organisation, because it's preferable to the stress that usually accompanies change. One way of doing that is to *do exactly what is specified and nothing more.*

While rewards, monetary and otherwise, sounds like a straightforward solution to the lack-of-motivation problem, the careful IKM practitioner will bear in mind that when it comes to individuals "*the issues' roots are complex and tangled*" (Ackoff & Rovin, 2003:100). Research unveiled at the London School of Economics and Political Science (2009), for example, suggests that performance-related pay may even be counterproductive:

"An analysis of 51 separate experimental studies of financial incentives in employment relations found overwhelming evidence that these incentives may reduce an employee's natural inclination to complete a task and derive pleasure from doing so."

Further, while McDermott and O'Dell (2001:81), among others, suggest that reward and recognition systems "*demonstrate that the time and energy people spend sharing knowledge 'counts' in their performance and career*, recent research has begun to show that 'performance' and 'career' is proving to be of dwindling importance to Generation X and Generation Y employees who are increasingly "*[redefining] their positions as jobs rather than as vocations or callings.*" It is becoming more and more difficult to find rewards that motivate employees who have, what Backon (quoted in Knowledge@Wharton, 2006:2) calls, 'reduced career aspirations'. These employees do not aspire to huge salaries or high status positions, but are rather "*taking energy that had been focused primarily on goals defined by the corporation and focusing it elsewhere.*" To many this may not sound like a rational choice, which brings us to the next core category, and Daniel Ariely's recent findings in the field of behavioural economics.

"*Some people*"

A number of respondents' comments support Cilliers' (2002:80) assertion that "[the individual] *is a complex thing in itself.*" Respondents note that certain colleagues choose to "*keep to themselves and not share easily with others*", some are not accessible, some are shy, and some don't ask questions because they "*don't want to look stupid*".

Ariely (2009:80) suggests that it's time for organisations to abandon the assumption they've been operating on for decades, namely that people - customers, employees, managers - make logical decisions. Rather than being rational, his research findings show people to be fallible, less-than-logical, emotional, myopic, and easily confused and distracted. He concludes:

"We are finally beginning to understand that irrationality is the real invisible hand that drives human decision making ... that human beings are motivated by cognitive biases of which they are largely unaware."

Gotta (2009) points out that "*volunteered participation and resulting contributions are a daily decision employees make - and one that they essentially control.*" This supports Snowden's (2006) notion that "*knowledge will only ever be volunteered; it cannot be conscripted*." If we take into account that employees every so often make decisions that are not rational - that they "*make decisions on the basis of whims, hunches, heuristics or mental models*" (Perez & Batten, 2006) - it stands to reason that they may at times choose not to share what they know, even when organisational norms advocate it, and even when it may impact negatively on their compensation. Grey (2006) too, when he mentions that knowledge sharing starts with an individual's "*perception of self-worth, a feeling that you have something to offer, something of value to add [and that] this confidence is closely tied to your identity*", gives us an inkling that employees' collective histories, individual sensitivities, anxieties, and mental biases (Manzoni & Barsoux, 2009:51) have more to do with irregular information and knowledge flows than the current IKM literature suggests.

4.3.2 The large number of elements interact dynamically | "*Change all the time*" and "*A very different environment*"

The elements of a system, the dimensions of a system, and a system and its environment interact dynamically to the extent that it is practically impossible to 'disentangle' one facet from another. Ramalingam et al. (2008:14) explain the implications as follows:

These dimensions relate and interact in a dynamic fashion such that, when attempting to address the problem of 'poverty', it may not be possible to deal with each dimension in isolation, or to quantify the effects of an intervention in terms of direct 'impact' on the targeted 'dimension'.

In addition "*any change in a particular element or dimension has an influence on others in the system*" (Ramalingam et al., 2008:17). From an information and knowledge sharing viewpoint, this attribute even further increases the descriptive complexity of the system. When documenting, as part of a lessons learnt exercise for example, why a specific initiative failed or succeeded, it is not enough to detail the elements that formed part of the endeavour (such as individuals, communication events, applications). To paint a truthful picture, it is necessary to detail the "*vast, nonlinear web of incentives and constraints and connections*" (Waldrop, 1992:65) - the dynamic interplay between

situational factors such as culture and politics, psychological and socio-cultural factors operating within staff, interpersonal factors, and many more. It's patent that this is impracticable. As Rescher (1998:30-33) says:

The real has an inner complexity that is humanly inexhaustible and the range of fact inevitably outruns that of articulable truth.... The upshot is clear. The descriptions that we can ever actually provide for real particulars are never complete.

Other than the fact that a complex system's 'interrelational elaborateness' defies description, certain organisational issues are deemed 'undiscussable'. Post (2002:28) - tasked with spreading organizational know-how through storytelling at NASA - note that some issues are simply not easy to discuss: "*No matter how progressive an organization sees itself, there are things many people would prefer just to ignore.*" Argyris (1999:438) explored the notion of 'undiscussables' - organisational issues that are not acknowledged nor open for discussion. Respondents' comments like "*people don't have time to share it and quite frankly they're not motivated to share it*" and "*if they don't like you they're just going to say 'no'*" hint at such 'undiscussables'. From a knowledge sharing perspective this clearly adds to the 'wickedness' of the lack-of-sharing problem.

4.3.3 The interactions are non-linear

Cilliers (2000:43) makes the following point:

"Because of the nonlinearity of the interactions constituting a complex system, it cannot be 'compressed'. Any simplifying model will have to leave out something, and because of the nonlinearity, we cannot predict the significance of what is suppressed. In order to capture all the complexity, we will have to 'repeat' the system in its entirety."

The implications of the above for information and knowledge sharing are very important. One example of information and knowledge sharing centering on a project in progress at the time of writing can be used to illustrate. The project was led by an experienced project manager who is committed to information and knowledge sharing and very technology savvy. Twelve months into the project 277 information objects had been published to the project repository. The collection comprised versions of project plans, risk and issue registers, meeting notes, financial trackers, working group charters,

team responsibilities, requirements briefings, usability studies, mock-ups, and more. However - to underline Cilliers' (2002:78) point - since "*we cannot keep track of all the millions of nonlinear interactions when we have to describe it*" some things escaped 'capture' in the repository. While decisions made, for example, were captured, alternatives considered and rejected were typically not. The same goes for documenting *why* a specific alternative was selected rather than another. In addition, it was observed that individuals surprisingly quickly forget the 'why' of a decision. As Walsh and Ungson (1991:68) learned, "*the 'why' in a decision will distort and decay as it is passed over time from person to person.*"

This tie in with Weick's (1995:28) notion that individuals frequently 'massage' events retrospectively to be consistent with perceived outcomes:

The basic finding that investigators keep returning to is that people who know the outcome of a complex prior history of tangled, indeterminate events remember that history as being much more determinant, leading 'inevitably' to the outcome they already knew. Furthermore, the nature of these determinant histories is reconstructed differently, depending on whether the outcomes are seen as good or bad. If the outcome is perceived to be bad, then antecedents are reconstructed to emphasize incorrect actions, flawed analyses, and inaccurate perceptions, even if such flaws were not influential or all that obvious at the time. Thus, hindsight both tightens causal couplings and reconstructs as coupled events a history that leads directly to the outcome.

The problem with this 'selective memory is that "*under nonlinear conditions we will never know if something that was left out because it appeared to be insignificant was indeed so.*" (Cilliers, 2000:128) The upshot is that lessons learnt, good practice, case histories - the 'knowledge objects' information and knowledge managers 'capture' in content repositories - often lack the contextual richness necessary to make it valuable. As seen in the example above, it is frequently not for lack of trying, but because the organisational context is so rich that it defies full capture. We simply "*cannot keep track of all the millions of nonlinear interactions when we have to describe it.*" (Cilliers, 2002:78) We might ask "so what if we neglect to note one or two small things?" to which Cilliers (2000:26) answers: "*Something we may think to be insignificant (a casual remark, a joke, a tone of voice) may change everything.*"

4.3.4 The interactions usually have a fairly short range, i.e. information is received primarily from immediate neighbours | Clustering together ("*Saamkoek*")

A number of respondents noted that information and knowledge primarily flows among "*the guys you work with closely*", since employees for the most part "*work in silos.*" Lack of contact among individuals who are beyond a certain number of degrees of separation in a network has been identified as a barrier to information and knowledge sharing by a number of authors. The law of propinquity states that "*the frequency of communication among organisation members decreases more than linearly with distance.*" (Krackhardt in Travica, 1999:131) This would support the notion that individuals often get their information from their organization 'neighbours'. Davenport and Prusak (1998:41) refer to this phenomenon as the "localness of knowledge", and identify different reasons for it. For one, individuals will sooner exchange information with those they trust, and research has shown that initial face-to-face interaction is generally a prerequisite for the development of trust. Moreover, it often takes time and effort to identify 'distant knowledge', especially for individuals who have a limited network range. Consequently, individuals will 'satisfice' - settling for information that is easy to come by - rather than 'optimal knowledge'.

Friedkin (1983:54) too argues that individuals who are beyond a certain number of degrees of separation in a network are unlikely to be aware of the work done by one another. He puts the distance at "*two or more steps removed*", and terms this the "*horizon to observability*" beyond which individuals can't see the expertise potentially available to them. This means that a lack of social ties can act as a barrier to information flows even among individuals who are physically proximate. Dixon (2004:21) points out that lessons learnt spread in much the same way as gossip through an organisation, and that individuals who are out of the organisational social network loop - 'isolates' to use Krebs' term - are likely to be bypassed by information flows.

Davenport and Prusak (1998:18) also point out that the mere existence of information and knowledge in an organisation is of limited value if it is not accessible. The 'market signals' - "*information that indicates both where knowledge resides and how to gain access to it*" - are often weak in organisations. The saying 'if only we knew what we

know' is often quoted by employees in large, geographically dispersed organisations, typically soon after a case of reinventing the wheel. While information access technologies such as keyword search, natural language search, multimedia search, and guided navigation are valuable in finding codified information, expertise embodied or embrained in an unsociable employee will in all likelihood go unnoticed, evading the IKM processes that aim at incorporating it into the organisational knowledge base.

One interesting point to note - which is further discussed in the 'Unanticipated findings' section, is that the rich interaction between elements in a complex system (which entails that the route from one element to another can usually be covered in a few steps) seem to enable rather than inhibit fluent information and knowledge flows. This particular attribute may mitigate the issue that interactions usually have a fairly short range. Similar to the game Telephone or Chinese Whispers, in which the first player whispers a phrase or sentence to the next player and each player successively whispers the message to the next player (Wikipedia), employees pass information along from individual to individual, relying on 'boundary spanners'[4] to transfer the message across group borders.

4.3.5 They are usually open systems, i.e. they interact with their environment | "*Change all the time*"/"*A very different environment*" and "*When knowledge leaves*"/"*The original thoughts*"

Bergson (in Tsoukas, 2005:181) has the following to say about change:

"We say that change exists, that everything changes, that change is the very law of things: yes, we say it and we repeat it; but those are only words and we reason and philosophize as though change did not exist."

When IKM practitioners design and implement initiatives the need to remain mindful that 'change exists' is vital. Hernes (2008:i) notes that in a 'tangled' world practitioners need to manage in a 'fluid' space in which markets, products, standards, technologies, institutions and social groups change incessantly. Dooley (2004:359) adds to this list that employees are constantly added or removed (for example when organisations

[4] Cross and Prusak (2002:104) describe a 'boundary spanner' as an individual who consults with colleagues in other departments.

expand or downsize), connections between employees change (for example when organisations restructure), organisations change their strategies, and individuals' schemas evolve. New problems arise, new knowledge is constantly created, and even organisational routines, which are traditionally viewed as by and large stable, are in reality "*emergent accomplishments … that perpetually change in action*" (Feldman in Tsoukas, 2005:183). As employees go about performing their tasks they constantly adjust and modify the given organisational structure, so that the 'given' structure is in effect continually evolving (as depicted in structuration theory). All of the preceding leads Tsoukas (2005:184) to label the nature of organisational life as 'dynamic and change-full'.

A number of responses make it clear that employees find information and knowledge sharing in the midst of 'change-full' organisational life challenging. One respondent neatly summarised the challenge when saying "*something that is the case now may not be the case in six months time.*" Heedful of the 'change-full' nature of organisations, Walsh and Ungson (1991:76) caution that whenever employees tap into "*stored information from an organization's history that can be brought to bear on present decisions*" (their definition of organisational memory), they have to consider carefully the similarities and differences between the past and present situation, since the two are prone to be out of step.

One change that individuals appear to find particularly disruptive is the coming and going of colleagues. This will be discussed next.

4.3.6 Complex systems have a history | "*When knowledge leaves*"/"*The original thoughts*"

As mentioned earlier, every complex social system has a 'system level memory' in which is captured remnants of its past (Richardson, 2005:622). This history/memory is captured both at the microscopic level, e.g. personal experiences, personal opinions and worldviews, and at the macroscopic level, e.g. culture, rituals and value systems (Van Uden, Richardson & Cilliers, 2001). With reference to the microscopic, personal level, April (2004:128) points out that when individuals leave an organisation they take along "*their skills, ideas and knowledge of work processes, breaking important relationships*

that kept a department or division working efficiently and effectively." Though fragments of information regarding decisions made and problems solved - what Walsh and Ungson (1991:62) deem the core of organisational memory - may be retained in an organisation's culture, structure, content repositories and the like, only individuals have the cognitive ability to understand and recollect the reasoning behind decisions and actions. (Walsh and Ungson, 1991:62)

To make a bad situation worse when it comes to organisational knowledge retention, individuals do not have all the facts they need to engage in 'intelligent behaviour' firmly in mind. Rather, at a spatio-temporal point of need, individuals draw on the more general propositions and knowledge structures in their existing knowledge base to 'infer things'. On top of that, individuals also draw on the sub-cognitive, sub-symbolic "*shadowy stuff in the background of the mind*", i.e. instinctive knowing or intuition (Bereiter, 2009:28). We can ask an employee to write down all the if-then rules he or she make use of in the course of their job, but it will be of little use when the context - the 'if' - changes.

4.3.7 Each element in the system is ignorant of the behaviour of the system as a whole; it responds only to information that is available to it locally / "*Missing something*"

Davenport and Prusak (1998:17) maintain that when the size of an organisation exceeds two hundred to three hundred people, employees lose their grasp on "who knows what" in the organisation. As an organisation grows and typically becomes more geographically dispersed, its knowledge base disperses accordingly. When this happens employees understandably lose their grasp of the organisational knowledge base as a whole, whether it is knowledge embodied or 'embrained' in people, or information embedded in documents. Whereas in a smaller, co-located arrangement, employees typically have a good grasp of who knows what, who can help with a specific problem, or who would most likely benefit from new information, this is less likely to be the case in a large, dispersed organisation. Research found that individual experts and specialist communities in large, distributed organisations are often unaware of employees within their own organisation with similar or complementing interests and expertise. Rather than having an integrated, organisational-level knowledge base, an organisation

becomes "*a vast metropolis of disparate communities*" (Hislop, 2001:13) among which information flows sluggishly, if at all.

4.4 Unanticipated findings

An unexpected finding emerged from the data, namely that a complex social systems lens not only shows up persistent barriers to information and knowledge sharing, but also enablers. Certain characteristics of complex social systems are leveraged by employees to smooth the progress of information and knowledge flows.

4.4.1 Complex systems operate under conditions far from equilibrium

Observation tentatively suggests that, as far as information and knowledge sharing is concerned, the far-from-equilibrium state of a complex social system can act either as a barrier or enabler. In a far-from-equilibrium state a system is perturbed by activities and/or events occurring 'outside the norm' for its current context that push it from its original state into a new direction. The outcome of the system's far-from-equilibrium state is emergence through self organisation (Lichtenstein & Plowman, 2009:620; McClure, 2004:45). Within organisations, emergence entails "*organizational members or lower level system participants interact[ing], exchang[ing] information, and act[ing], without coordination from a central decider, resulting in unintended changes at higher levels within and beyond the focal organization*" (Lichtenstein & Plowman, 2009:617). Cilliers (1998:89) concurs that this is how complex systems change, not through an external designer intervening in the system, or through some form of centralised internal control, but spontaneously through the interactions of individuals. This process, through which "*macroscopic behaviour emerges from microscopic interactions*", (Cilliers, 1998:92) is termed self organisation.

One significant instance of the above is changes in organisational culture emerging from the interplay of the internal models of various agents. Lichtenstein and Plowman, (2009:619), drawing on Kauffman, describe this process as follows:

"[T]he agents in the system recognize the meaning of a given exchange, and adjust their own behavior as their response to that meaning within the system. As they do so the system changes: it is not the same system as it was before. That is, when an agent adjusts to new information, the

agent expands his/her own behavioral repertoire, which, in effect, expands the behavioral repertoire of the system itself."

Hints of the emergence of an expanded 'behavioral repertoire' regarding information and knowledge sharing were observed within the organisational social software pilot. Admittedly, intimations of the 'macroscopic behaviour' Cilliers talks about could only be observed within the pilot group - not the entire networked firm. One example of 'outside the norm' activities instantiated within the pilot was the wider sharing of user/group generated content. Where, as mentioned earlier, content was typically kept "*in a close group of people who know how to use it*", a small medley of groups began to allow open access within the networked firm to their content. 'Outside the norm' interactions across a group of agents are beginning to nudge the system from its original state into a new direction - from a siloed information state to "*an open, transparent marketplace, a marketplace of ideas, a place for practitioners to exchange views with others publicly and refine them*" (employee blog post). Another 'outside-the-norm' activity that began to surface is 'personal outbound messaging' - "*folks voicing their opinions on the kinds of things they're working on*". These microscopic activities (i.e. individuals exchanging and refining ideas with colleagues 'publicly', and employees engaging in their professional roles in public social media forums), through their humanizing influence, have the potential to shift the system culture away from one in which the firm only ever speaks with a "corporate voice" (employee blog post).

4.4.2 There are positive and/or negative feedback loops in the interactions

Observation tentatively suggests that positive feedback loops may play a role in encouraging or discouraging information and knowledge sharing. McLucas (2003:216) notes that positive feedback is "*a form of circular causality which acts as a growth generating mechanism*", or, as expressed in Wikipedia, "*A produces more of B which in turn produces more of A*." In the social software pilot it was noticeable that blog- or forum posts that produced/provoked numerous comments acted as a prompt for the post author to generate more posts. Following Wikipedia's logic, blog- or forum authors whose posts generated the most comments tended to become the most prolific blog- and/or forum posters, in turn generating the most comments. In McLucas' phrasing, participation caused participation to grow. It is important to note that 'positive'

feedback in this sense does not connote feedback "*characterized by or displaying affirmation or acceptance.*" (Wordnet) In a number of cases the commentators opposed or criticized the post author's point of view, but still it seemed that a tendency to comment created a virtuous circle of communication. Similarly, authors whose posts attracted few or no comments tended to lose interest in posting fast, in effect creating a vicious circle. When asked about their dislikes pertaining to the social software tool, one employee mentioned "*the lack of people commenting. [The tool] stands or falls with the usage.*"

4.4.3 The dynamic interaction between the elements is rich / "*Take the message further*"

Whilst interactions within organisations have a fairly short range, i.e. individuals receive information primarily from immediate neighbours; employees leverage the rich interaction between colleagues to get their message out, and to keep their ear to the ground. To repeat what one respondent revealed, "*you don't expect to hit everyone when you forward the email, but then you expect them to forward it again."* Since, in complex systems, the route from one element to another can usually be covered in a few steps, employees will share their message with colleagues known to them, but also ask these colleagues to pass the message on to non-mutual colleagues.

4.5 Conclusion

In this chapter the data collected from intensive interviews and participant observation were presented. The categories that emerged from the methodical analysis of interview transcriptions, field notes, and internal firm content were: 101 Things, Not getting anything out, Change all the time/A very different environment, When knowledge leaves/The original thoughts, Some people, Missing something, That kind of relationship, Take the message further, and Clustering together ("Saamkoek").

Next the categories that emerged from the data were compared to the preconceived categories which were formulated to correspond to the characteristics of complex systems found in the literature, namely A large number of elements, Dynamic interaction among elements, Rich interaction among elements, Non-linear interaction among elements, Short-range character of interaction, Feedback loops, Open systems,

Far from equilibrium, System history, and Ignorance of the behaviour of the system as a whole.

Chapter 5
Conclusion

5.1 Introduction

Chapter 5 presents a summary of the findings of the study and the contribution of the study is considered. Implications for managing information and knowledge in a complex space are discussed under three headings, namely social software, narrative, and personal information and knowledge management. The chapter concludes with suggestions for further research.

5.2 Summary of findings

This study found that the persistent barriers to information and knowledge sharing identified in an organisation lauded for being a leader in enterprise knowledge management correspond to the characteristics of organisations as complex social systems. Evidence to support the correspondence between the following characteristics of complex social systems and persistent barriers to information and knowledge sharing identified within the firm were found:

Research question	Support
Does the reality that an organisation consists of a large number of elements impede information and knowledge sharing within that organisation?	✓ Core category
Does the reality that the large number of elements within the organisation interacts dynamically impede information and knowledge sharing within that organisation?	✓ Observation

Research question	Support
Does the reality that the dynamic interaction between the elements is rich impede information and knowledge sharing within that organisation?	Unanticipated finding
Does the reality that the interactions among elements are non-linear impede information and knowledge sharing within that organisation?	✓ Observation
Does the reality that the interactions usually have a fairly short range - i.e. information is received primarily from immediate neighbours - impede information and knowledge sharing within that organisation?	✓ Core category
Does the reality that there are positive and/or negative feedback loops in the interactions impede information and knowledge sharing within that organisation?	Unanticipated finding
Does the reality that organisations are open systems - i.e. they interact with their environment - impede information and knowledge sharing within that organisation?	✓ Core category
Does the reality that organisations operate under conditions far from equilibrium impede information and knowledge sharing within that organisation?	Unanticipated finding
Does the reality that organisations have a history impede information and knowledge sharing within that organisation?	✓ Core category
Does the reality that each element in the system is ignorant of the behaviour of the system as a whole impede information and knowledge sharing within that organisation?	✓ Core category

An unexpected finding emerged from the data, namely that a complex social systems lens not only shows up persistent barriers to information and knowledge sharing, but

also enablers. In some instances employees leverage the attributes of complex systems to support information and knowledge sharing.

5.3 Contribution of this study

While a number of studies identified barriers to information and knowledge sharing, this study ventured an explanation as to why certain barriers persist - even in organisations where mature information and knowledge management programmes are in place. The insight derived from this study mirrors that of Weick (1995:187-188), namely that not all issues are amenable to being fixed and staying fixed:

"Closer to the nature of organizations is the idea that they are issues to be managed rather than problems to be solved. Issues keep recurring, albeit in different forms. One never expects issues to go away completely. And believing this, one is not disheartened when they keep reappearing, as they will, because they are built largely of trade-offs and dilemmas that keep being resolved in different ways due to changes in the context."

The insight that not all barriers to information and knowledge sharing can be conclusively eliminated - that the mesh of barriers, being part and parcel of organisations, constitute a 'wicked problem' that can at best be mitigated - allows practitioners to set realistic expectations around what IKM programmes can deliver. Certain issues can be addressed in a fairly straightforward way: a lack of IKM roles can be addressed by defining and filling roles; lack of funding can be addressed by making a business case and securing funding; lack of physical space for knowledge sharing can be addressed by creating said spaces (and the same goes for virtual spaces); a lack of information and knowledge sharing competencies can be addressed by developing and presenting training courses; an hierarchical organisational structure can be flattened, and so forth. However, not all issues can be addressed in such a conclusive manner. Despite our best efforts, employees - being less-than-logical, emotional, biased, *complex* to put it in a nutshell - may in some instances choose not to share what they know, even if it reflects negatively on their key performance indicators; the environment will continue to change at breakneck pace, making it impossible to for individual and organisational knowledge bases to stay current; organisations will continue to operate globally, with the likelihood that employees will overlook colleagues in different locations with

complimentary knowledge bases. Because organisations are what they are (i.e. "*vast, fragmented and multidimensional; among the most complex systems imaginable*" - Boulding in Weick, 2001:242), and individuals are what *they* are ("*fallible, less-than-logical, biased, emotional, myopic*" - Ariely, 2009:84) certain barriers to information and knowledge sharing *will* persist.

5.4 Implications and recommendations: managing information and knowledge in a complex space

"Complexity is a relatively new discipline with immense power to change our way of thinking and seeing the world. This, in turn, can change the way we 'manage', design and structure organisations and create new ways of working and relating." (Mitleton-Kelly, 2003:3)

"If complexity, in all its aspects, is seen as a challenge to be managed and potentially exploited, not as a problem to be eliminated, businesses can generate additional sources of profit and competitive advantage." (Heywood, Spungin & Turnbull, 2007:85)

The reality that persistent barriers to information and knowledge sharing are inherent in organisations, along with the unanticipated finding that certain properties of complex social systems may be leveraged to facilitate organisational information and knowledge sharing, holds important implications for practice. Combining approaches that work with the properties of complex systems (i.e. pattern management in its various guises) with tools, techniques and practices that are proving to be suited to supporting information and knowledge sharing in complex environments, may be a viable way forward for IKM practitioners. It is important to emphasise that new tools alone will in all likelihood not deliver the desired results. A management approach mindful of the dynamics of operating in a complex space is decisive. As Rihani (2002:93) advised:

"Command-and-control methods are useless. They might succeed temporarily when applied with sufficient force but they are not sustainable as long-term policies. Complex adaptive systems respond better to light-touch styles of management based on constant monitoring of overall patterns of performance coupled with judicious small-scale incremental adjustments."

When it comes to getting individuals to share what they know, a 'thou shalt' approach - thou shalt enter into dialogue, thou shalt maintain a blog, thou shalt share deep smarts

via mentoring - simply does not cut it. Rather, following Rihani's suggestion, IKM practitioners should alertly observe existing and emergent patterns within the organisation, disrupting those that are undesirable and reinforcing or seeding those that are desirable. For instance, communities may be seeded by providing cohesive platforms for collaboration. Fledgling communities may be strengthened by actions such as putting a technology support team in place, creating user guides where handy, offering training, seeding content where useful, and providing clear usage policies and governance where needed. Undesirable patterns, for example employees posting content that should be kept secure for privacy or compliance reasons, may be disrupted by creating 'walled gardens' for firm-use content only. Or, if employees use inappropriate language or link to inappropriate material, providing clear 'house rules' or social media etiquette guidance may disrupt the undesirable pattern. While these interventions won't turn all employees into adept information and knowledge sharers, it will make efforts easier for those inclined to share or sway those still deciding whether it's worth the effort. Weick (2001:431) calls this a strategy of 'small wins' - "*a concrete, complete, implemented outcome of moderate importance.*" While one 'small win' may seem insignificant, a repertoire of small wins on an ongoing basis prevents a large issue - such as poor information and knowledge flows - from becoming a numb point. When it comes to battling wicked problems, "*the science of muddling through*" (Lindblom in Camillus, 2008:104) is pragmatic rather than naive.

To present practitioners with some examples, the following sections will showcase a number of emerging tools, techniques and practices well-suited to facilitating information and knowledge sharing in complex organisational ecologies. These approaches are growing in popularity hand-in-hand with the growing acceptance that knowledge is not a 'thing' that can be managed and owned by an organisation (Stacey, 2001:4). Here is an extended quote from Karl Weick (2001:306) to begin the discussion:

"*To make sense of complex ecological change, people can either try to simplify the changes or to* ***complicate themselves****. Given the degree of complexity people face, it makes sense to* ***do everything possible to keep up****. Thus, to make sense of complex*

*change people need to **intervene and enact** in the interest of simplification: they need to **tell stories**, value imagination, and use **rich communication media** in the interest of complication; and they need to **encourage collective mindfulness through teams and networks** in the interest of both simplification and complication.*" (emphasis added)[5]

5.4.1 Social software: supporting "rich communication" and "collective mindfulness"

According to Conklin (2006:3) *"social complexity requires new understandings, processes, and tools that are attuned to the fundamentally social and conversational nature of work."* Social software, as the name suggests, is an assortment of technological tools geared towards supporting the "*social and conversational nature of work."* These tools speak to Weick's (2001:306) call for the "*use of rich communication media*" and "*collective mindfulness through teams and networks.*"

Wiktionary defines social software as a "*range of software systems that allow users to interact and share data.*" Examples of social applications include blogs, wikis, social network services, social bookmarking tools, social cataloguing tools, social online storage tools, and more. Social software falls within the ambit of Web 2.0 - "*the second generation of the World Wide Web, especially the movement away from static web pages to dynamic and shareable content.*" Organisations that have implemented Web 2.0 technologies are sometimes referred to as Enterprise 2.0 - a term introduced to widespread use by McAfee (2006:21).

Social software fosters the formation and growth of social networks, and subsequently adds value by leveraging the networked collective intelligence - i.e. the *"aggregate of many iterations of individual contributions via a computer-based network*" (Gartner, 2005:5) - that emerges from activities within these networks. A number of instances

[5] Heywood, Spungin & Turnbull (2007:85) challenges the recommendation to simplify complex systems. They argue that when organisations attempt to reduce organisational complexity by, for example, reducing business units, the number of countries in which they operate, or their range of products and services, the organisation consequently also destroys value. They do, however, support Weick's second recommendation - to 'complicate' the individuals operating in complex environments.

were observed where social software provided a platform for information and knowledge sharing within the network of firms, thereby fostering the emergence of new communities or strengthening existing ones:

5.4.1.1 Wikis

The Wikipedia experience has shown that many people who contribute snippets to an information object - whether it's "*knowledge, insight, experience, a comment, a fact, an edit, a link*…" - may produce high quality content (McAfee, 2006:26). Arguably this is even more likely in an organisational context where contributions are named. Here social software facilitates the sharing of individual insights to create an information object via a collective act of bricolage. An extract from an information object created through just such a process can be viewed in Addendum 2. It is the product of a group of vocabulary managers from various territories who collaboratively reviewed a controlled vocabulary via the Vocabularies Service wiki. Rather than sharing the expert insights provided only within the user group through email, it was made accessible to any employee interested. Whilst the participants performed no additional knowledge sharing tasks (over and above reviewing the relevant vocabulary), the history of the review, including the rationale behind the decisions made, was 'captured' as part of the process and will remain part of the organisational memory, even if the original participants leave the firms. Equally important, through "*sharing and exploring the issues together to build greater understanding*", the dynamic of the group started to change from being a collection of individuals to a community of practice (The Australian National University, 2009). Where the process started with the vocabulary managers addressing their comments to the vocabulary custodian, it grew into a dialog among all the participants with the aim of developing a shared understanding of how the vocabulary could be made most useful.

5.4.1.2 Blogs

O'Kelly (2006:5) describes blogs as web-based journals, usually presented in reverse chronological order and typically in a one-to-many format. The blog's audience can normally contribute to the blog by posting comments. In the course of the firm piloting a social software suite it became evident how these tools can foster community-building

and dialogue. In his blog, an employee invited comments on a selection of insightful questions pertaining to the use of tags in social software (see below). His questions prompted a significant number of astute responses from colleagues representing a variety of business groups. The individuals who 'clustered' around this blog subsequently entered into conversation with one another too, raising and discussing further issues around the topic of tagging, and working towards a pilot to test if controlled vocabularies can enhance information retrieval in a search environment. In addition links to these discussions were placed on a number of related sites. This example supports Gotta's (2008) assertion that social software is important in the IKM space because it has the potential to "*catalyze voluntary participation and contributions across all work categories to improve communication, information sharing and collaboration.*"

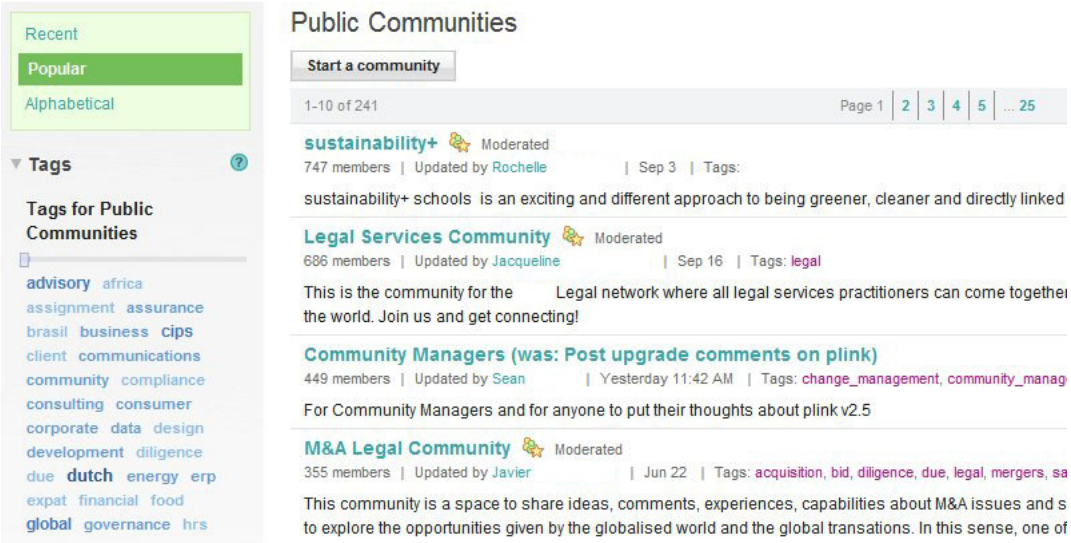
Figure 9: Questions that seeded a community

Plink/Connections seems to love tagging and tag clouds, but there doesn't appear to be any governance at the moment about how tags should be used and how Plink's tagging can be leveraged for business value.

Here are a few questions that I think the people running the pilot should consider about tagging if Plink ever gets close to becoming a BAU production application:

- **Personal vs social** - Do people primarily tag for their own benefit? Or are they motivated by a desire to share knowledge with a group, appear knowledgeable or other social factors?
- **Idiosyncratic vs standard** - Should tags be completely unique or idiosyncratic? Or should they be standardised so that they can be used for searching and browsing?
- **Freedom vs control** - Does the system give users complete freedom? Or does it influence or control their choices (i.e. from a pick list)?
- **Amateur vs expert** - How qualified are the people tagging? Should tags contributed by amateurs count as much as tags contributed by experts? How do you reconcile popular opinion expressed through tags with expert opinions when they disagree?

Figure 10: Subject-specific communities



5.4.1.3 Social bookmarking

Social bookmarking tools allow individuals to attach tags[6] to Web-based information objects. Over time, a categorisation scheme - or folksonomy in Web 2.0 parlance - emerges. While individuals primarily tag documents for their personal benefit, e.g. to organise and store useful information for reuse, the tags are often public. This allows others to identify information sources on a specific topic deemed useful by others. Since a tagger's name remains associated with the tag and the information object tagged (in the case of enterprise applications), it allows others to see who is interested in a specific topic.

[6] According to Wikipedia a tag is "*a keyword or term associated with or assigned to a piece of information*."

Figure 11: Items bookmarked and their taggers

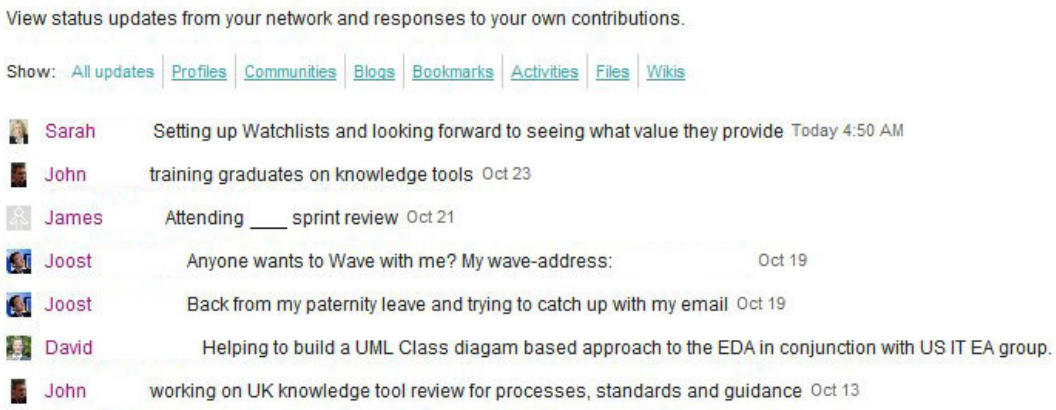
A folksonomy

5.4.1.4 Microblogging

Wikipedia describes microblogging as "*a form of multimedia blogging that allows users to send brief text updates or micromedia such as photos or audio clips and publish them, either to be viewed by anyone or by a restricted group which can be chosen by the user. These messages can be submitted by a variety of means, including text messaging,*

instant messaging, [and] E-mail." By subscribing to a colleague's status updates it takes little effort to remain aware of what s/he is working on. A microblog posting is also a quick and fairly effortless way to broadcast a request for information or expertise. It appears that microblogging may further play a social and emotional role by enhancing the feeling of connectedness among co-workers. (Wikipedia) Observation tentatively suggests that employees are increasingly interspersing postings of a personal nature with task-related ones.

Figure 12: Status updates/microblog postings



Based on the examples above it stands to reason then that social software comes to its right in environments were large numbers of individuals interact informationally, i.e. complex social systems. By aggregating individual contributions social software technologies "*make emergent structures and patterns in content visible.*" (McAfee, 2006:26) In 2004, before enterprise social software became comparatively pervasive, Denham Grey wrote:

"The key to knowledge sharing may lie beyond your immediate community of practice, outside your department and with a larger group of all stakeholders. The challenge is to discern the interests of others and the value you bring. Here the intranet can play a central role by helping all to locate and connect with others based on context, competencies and interests.

Social software has proved to be very effective at surfacing "*the interests of others*." It creates what Tan (2008) calls 'ambient awareness' and entails "*knowing what your colleagues in another part of the building/city/country/globe are thinking or working*

on, and being able to connect and collaborate far more easily because you kinda know each other even though you've never met." The value of this ability becomes clear when one takes into account that "*humans cluster around shared interests*", and that these 'clusters' "*create a social context for connections and conversations to occur*." (Howard, 2008) As regards information and knowledge sharing this is key, seeing as "*[t]he road to knowledge is via people, conversations, connections and relationships. Knowledge surfaces through dialog*." (Grey, 2005)

5.4.2 New techniques: narrative

Dixon (2009) stresses:

"Our most effective knowledge sharing tool is conversation. The words we choose, the questions we ask, and the metaphors we use to explain ourselves, are what determine our success in creating new knowledge, as well as sharing that knowledge with each other."

When one considers the alternative name for social technologies, i.e. conversational technologies, the potential synergy between the tools well-suited to facilitate information and knowledge sharing in organisations, and the techniques well-suited to the endeavor, becomes evident. In social software we have applications well-suited to building 'collective mindfulness' through dialog. If, as mentioned in chapter 1, individuals construct new knowledge in unison through communicative interactions (Stacey, 2001:9), organisational IKM interventions within complex social systems should focus on those tools and techniques that enable and leverage communicative interactions. In a previous section it was argued that social software *tools* are well-suited to supporting information and knowledge sharing in organisations. In the same vein, narrative is a *technique* well-suited to support communicative interactions in organisations.

Fortunately narrative (or storytellling) comes natural to individuals. White (1987:1) proclaims that "*so natural is the impulse to narrate, so inevitable is the form of narrative for any report of the way things really happened, that narrativity could appear problematic only in a culture in which it was absent.*" Narrative is the intuitive way through which individuals sequence the ongoing flow of their apparently disconnected experiences into a whole, i.e. a describable plot with a beginning, middle

and end (Tsoukas, 2005:246). Since employees are already "*all tellers of tales*" (McAdams quoted in Denning, 2002:3) IKM practitioners and their senior business sponsors should focus on surfacing conversations within the firm. As mentioned already, one way is by putting the mechanics - the conversational technologies and support - in place. Secondly, IKM practitioners and their senior business sponsors could assume the role of 'tags', i.e. "*identifiers for a valued set of behaviour ... who directs attention to things that are important. The tag is seen as symbolizing a message that is trying to be communicated through the system*" (Lichtenstein and Plowman, 2009:625). The CEO of the firm can be seen to assume the role of a 'tag' by publishing an internal blog where he shares opinion pieces and by maintaining a presence in a number of communities. By sharing their own narratives and directly participating in communities IKM practitioners and sponsors can walk the talk, and coax colleagues to follow.

5.4.3 Personal information and knowledge management

*"*We are all managing knowledge, and we have to learn to do it effectively*." (Firm Knowledge Manager)*

In a complex environment individuals first and foremost *keep up* by *complicating themselves*, i.e. increasing their requisite variety. For individuals this means developing sufficient internal complexity in terms of skills and abilities to deal with the challenges of a complex environment (Morgan, 2007:109). In a McKinsey study, Heywood, Spungin and Turnbull (2007:86) relate complexity to "*how hard it is to get things done.*" Individuals who possess requisite variety can leverage their skills and abilities to make it *less hard to get things done* (to paraphrase the McKinsey authors). The McKinsey study accordingly identified capability building as key to leveraging organisational complexity. A number of respondents in this study noted that employees should learn how to use existing tools well, rather than simply bringing more tools on board. For one respondent it meant that "*we need to use as much effort to educate our people on our existing 'finding' capabilities as we might do to get them connecting through a social computing tool.*"

As regards information and knowledge sharing in complex environments, 'complicating themselves' entails employees developing sophisticated personal information

management (PIM) and personal knowledge management (PKM) skills and abilities. These include skills pertinent to the development and maintenance of social networks and communities, content managing and filtering paper and electronic information resources, sharing information and knowledge peer-to-peer (including open dialog and productive inquiry), and so forth (Pollard, 2005; Ark Group, 2004; Grey, 2009). In view of the above The Ark Group recommends that organisations invest time and resources "*to make knowledge workers better at capturing, sharing and using knowledge, and maximising their personal effectiveness in the social and relationship-building part of their jobs.*"

While currently evolving social software applications show much promise regarding the development of an organisational ecology that is conducive to information and knowledge sharing, these tools are invariably less instinctive to use than vendors profess. While it is often stated that the so-called digital natives have an innate aptitude to leverage these tools, it was observed that a large number of employees find them less than intuitive to use. Employees piloting a social software tool within the firm lamented their inability to hit the ground running, declaring - for example: "*having just found this site, I'm not sure what the point is*", "*how do I use this tool for business?*", and "*I think that the pressure for a good blog is confounding me ... I don't even know how to blog*".

Organisations that focus on building their employees' capabilities to use these applications optimally will provide their employees with skills that go a long way towards sharing information and knowledge effectively within present-day organisations. Practical ways in which this is done within the firm is by having dedicated teams of employees who assist colleagues who run into difficulties using applications at the point of need, who provide training sessions on the various applications, and who maintain lists of frequently asked questions (FAQs) to share learnings.

5.4.4 A caveat

It is important to note that the above recommendations do not profess to be fail-safe solutions that enable organisations to overcome barriers to information and knowledge sharing. Leveraged intelligently, they may mitigate barriers experienced at a point in

time, but they may need to be adjusted as the organisational context changes. It pays to heed Groff and Jones' (2003:158) warning:

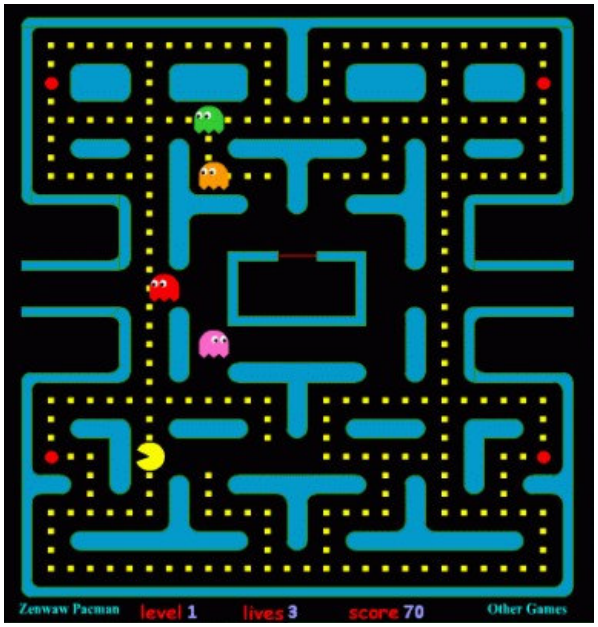
"In solving wicked problems, the solution of one aspect of the problem often reveals (or creates) another, more complex problem."

Unsophisticated deployment of social software, for example, may just add to the *101 things* employees try to steer clear of. The same goes for initiatives aimed at improving employees' personal IKM and narrative skills. This may explain the attraction of "*keeping analyzing the issue rather than doing something about it*." (Camillus, 2008:104). It is understandable why, across-the-board, theorists and practitioners agree - making IKM initiatives work is no easy feat. Poole and Van de Ven (2004:35) consider us warned when they say:

Complex phenomena … challenge us to increase the complexity of our thinking. If the resulting theories or research agendas seem complicated and in some cases unwieldy, then we would suggest that it is because we have become habituated to simplicity."

In the end, information and knowledge management resembles nothing so much as the popular video game Pac-Man. Working his way through a maze, Pac-Man every so often acquires a 'power pellet' that provide him with the temporary ability to eat his adversaries - the 'ghosts' - only to have them regenerated and become dangerous again. The ghosts are bound by the maze in the same way as Pac-Man.

The game technically has no ending.



5.5 Further research

According to Ramalingam et al. (2008:8) the applicability and relevance of complexity concepts may best be observed "*through empirical studies of practical realities*". It is envisaged that the findings of this study will contribute context-specific insights, out of which commonalities will become visible. Since the characteristics of Global MAKE award winners relating to IKM are clearly delineated, it will make sense to 'replicate' this study within Global MAKE award winning organisations in other sectors.

While a number of authors suggest pattern management as a suitable approach to managing in a complex space, good practice and examples to guide practitioners are in short supply. Cases exploring how information and knowledge sharing behaviours and activities may be seeded, how desirable patterns may be identified and encouraged, and how undesirable patterns can be disrupted may prove invaluable to practitioners.

In addition, the potential of specific tools, e.g. social software, and specific techniques, e.g. storytelling, to support relationship building and to foster the emergence of communities of interest in organisations are valuable areas for further research.

Addendum 1
Interview guide

Introduction

Areas to cover:

Introductions and thanking the client

Explanation of the interview and what to expect

Length (approx. 60 mins)

Unstructured conversation with some guideline question areas

Explain how the results will be used i.e. who will see them, how they will be reported on, confidentiality, etc

Mention that the conversation will be recorded

Source: Firm Interview guide

Engage

Guideline conversation areas

- [Story in a word]
  How do you experience connected thinking within the firm?
- [Future story]
  It is 2015 and the firm is recognised as the poster child of successful information and knowledge sharing. What is life in the firm like today [remember it is 2015]?
- Within our network of member firms information and knowledge sharing is defined as getting "*the right content to the right person at the right time*". In your experience, does this happen unfailingly?
- Can you tell me about occasions where you struggled to get "the right content to the right person at the right time"?
- Can you tell me about occasions where the content and/or expertise you needed to get a job done was not readily available?

Addendum 2
Global Vocabularies Service Wiki Extract

Just another comment on the subject/content type question. I've always found it useful to ask myself "what is this thing being classified" in order to define its content type, while qualifying my answer with 3 further questions (and I want the answer to be no to these 3 questions): "am I saying what the content's about", "am I saying where the content came from" and "am I saying what the content's purpose is".

If we attempt to specify the LoS applicability of a particular type, are we not making the LoS facet superfluous? For instance, if I go back to my example of Tax Alerts, why are would we include the 'Tax' part (since it's already dealt with, rightly I might add, in a different facet).

While I understand the need for LoS specificity, I don't feel that content type is the place to address this issue. LoS essentially functions as a subject hierarchy -- grouping subjects into larger broad-based subject clumps. Business issue (I'm not sure what it's called now) in my mind approaches this subject hierarchy from a different perspective, but is still essentially a subject hierarchy. I'm a bit concerned that we're going to drive ourselves nuts trying to organize by subject -- we don't want to start recreating LCSHs from scratch. I think this point is especially important since I don't feel most users information seeking behaviour is search post-filter based -- for better or worse, if people don't find what they're looking for, they usually just try different keywords. IMO, creating an overly long and detailed list of content types starts to get into subject heading territory, and it becomes a monster to maintain for the small user base that actually uses it.

Also, I agree with J__ that getting into the sourcing of content within content type is a bit problematic as well -- and it opens another Pandora's box of limitless sources (much like the limitless subjects problem I mentioned above).

Just my two cents.

Posted by • L_____ M_____ at Mar 03, 2009 20:56 | Edit | Remove | Reply To This

> I agree...questions like "what is this thing being classified" are a great method to test vocabs. Once you've decided on the definition, direction or strategy of a vocab, it needs to withstand the test of what's being classified.
>
> Posted by • B_____ S__ at Mar 05, 2009 14:12 | Edit | Remove | Reply To This

I had a working meeting with H___ T___ yesterday morning. We went the through Content/Subcontent Types as well as the feedback that has come in on the wiki. Below you will find his comments.

- We should probably remove the subcontent types altogether
- Break Best Practice & Benchmark into two separate content types

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